INDUSTRIAL MEDICINE

Industrial Health, Occupational Medicine and Traumatic Surgery

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The Relation of Hypersensitiveness
— To Poison Ivy and Cashew Nut Shell Liquid Pure Ingredients —

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— At a Port of Embarkation —

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— In Industrial Injuries —

The Consultant
— In Relation to the Plant Physician —

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— Incidence and Prevention, Non-Occupational —

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1. Solis-Cohen, S. and Githens, T. S.: Pharmacotherapeutics, ed. 1, New York, D. Appleton and Company, 1928, p. 1375.
2. Tuft, L. and Levin, N. M.: Studies of the Expectorant Action of the Iodides, Am. J. M. Sc. **203**:717 (May) 1942.

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STILL under the handicap of the strike period —three weeks and two days in October, during which all production facilities were suspended—this issue is late. But we hope that fact will be not too severely dealt with by our readers, particularly after they have made their appraisal of the contents. For these, not only in the matters of author preparation and checking, but also — and equally important from our standpoint—in the tremendous and careful detail required in the tabular presentations and illustrations with which these pages abound,—represent a really sizable amount of skilled effort. Three of the feature articles are of monograph caliber; two are also of monograph length. The first of the two is COLONEL FELTON'S "Army Industrial Medical Program" (page 854); and the second is WARREN COOK'S "Maximum Allowable Concentrations of Industrial Atmospheric Contaminants" (page 936). The other article of length, and significance, is DR. RIEKE'S "Health Aspects of Aluminum Ponton Work" (page 896). Then there is DR. MCCORD'S "The Thymol-Barbitone Test in Clinical Practice" (page 835), regarding which we can say that it is the scientific keystone of a development of which more will be heard and which is of great importance to industrial physicians. Under "Industrial Health and Disease," there are three articles of the quality we like to give the widest possible circulation by way of reprinting here, DR. HOLMBLAD'S "Certification of Physicians and Surgeons in Industry" (page 921), from *J. Indiana State M. A.*, October, 1945, is of special significance at this time for the reason that there are so many aspirants to the title of "industrial physician and surgeon" who are not industrial physicians. . . . WITH only this space in which to talk about this good issue, we commend it to our readers.

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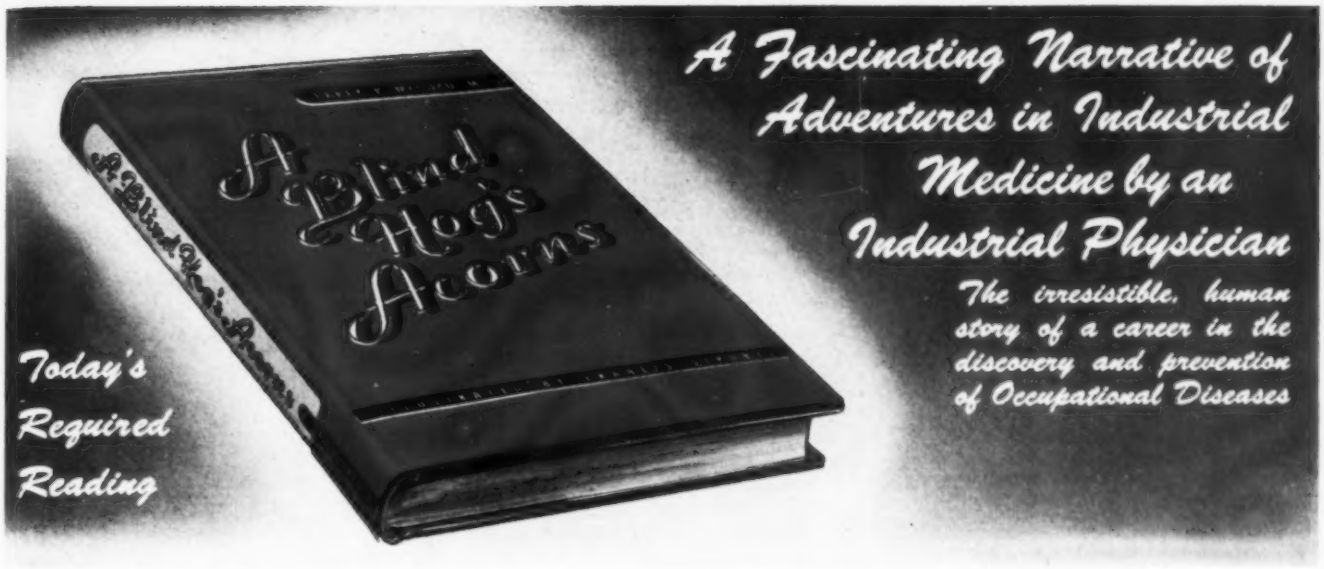
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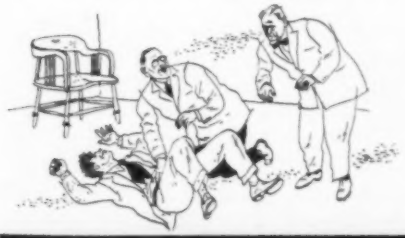

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PERSONAL

DR. H. J. SAVAGE has been appointed Medical Director of the Lima, Ohio, plant of Westinghouse Electric & Manufacturing Company, effective June 16, 1945.

DR. SARAH I. MORRIS, Philadelphia, has been appointed resident physician and professor of hygiene at Wilson College, Chambersburg, Pennsylvania. DR. MORRIS has been Professor of preventive medicine at Women's Medical College of Pennsylvania since 1931 and was also director of the student health service of that institution for 10 years. Previously she had been associate professor in the clinical medical department of the University of Wisconsin Medical School, Madison, and a member of the university's student health department.

DR. JOSEPH P. HOLT, Louisville, associate professor of physiology at the University of Louisville School of Medicine, has been appointed director of research in the medical department of the Standard Oil Company, New Jersey, according to *Science*, September 28.

—*J.A.M.A.*, October 27, 1945.

DR. WILLARD F. MACHLE, recently Director of the Army Medical Research Laboratory at Fort Knox, Kentucky, has established private practice in New York City. He will be available for industrial consultation.

DR. EDWARD E. DART, recently Medical Director at Chrysler's Dodge plant in Chicago, has become Chief of Chrysler's Industrial Hygiene Laboratory at Detroit, succeeding DR. LEWIS L. KLINE.

DR. AARON S. LEVEN, formerly of Chicago and recently Major M. C. A. U. S., announces the opening of offices at 211 South LaBrea Avenue, Los Angeles, California, where he will specialize in traumatic and orthopedic surgery.

DR. CLARENCE GOOD SHEARON, 46, National Medical Director of Montgomery Ward & Company and former Medical Consultant for Chicago Title & Trust Company, died November 17. DR. SHEARON was Associate in Surgery in Northwestern University's School of Medicine, Senior Surgeon at St. Luke's Hospital, and a Director of the Illinois Social Hygiene League. He obtained his medical degree from Northwestern in 1927 and a master's degree in surgery in 1932. He served in World War I.

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GENERAL

Without Medical Service

A BUREAU of Unemployment Compensation ruling that 221 Forge, Pennsylvania, coal miners are idle in an industrial dispute and entitled to benefits after August 18 was upheld today by Harvey C. Berkhouse, compensation referee. The miners have been off the job at the Shawmut Mining Company, Elk County, since July 14, after the mine physician, DR. ELIZABETH O. HAYES, refused to continue service because of what she said were "intolerable sanitary conditions." Berkhouse found "the men refused to work without medical service available at the mines in case of accident or injury," and ruled this was "a voluntary suspension of work resulting from an industrial dispute."

—*New York Sun*, October 30, 1945.

Industrial Survey

THE Missouri state industrial hygiene service has recently inaugurated a series of surveys, the first of which is being conducted in Franklin County. The object is to determine to what extent a comparatively rural county such as Franklin can support an industrial medical program. The Franklin survey is being carried out by the state industrial hygiene service in cooperation with the Franklin County Medical Society. DR. A. LINK KOVEN, Jefferson City, is chief of the industrial hygiene service and W. SCOTT JOHNSON is chief public health engineer. DR. KOVEN recently gave a talk before the Franklin County Medical Society on "Industrial Medicine and Its Potential Importance to Franklin County."

—*J.A.M.A.*, 129-11, 757, November 10, 1945.

Affable But Not Interested

AS INSTRUCTED at our September 30, 1944, meeting, the chairman held a personal conference with the Selective Service administration in Harrisburg, in the hope that we might assist in the proper placement of servicemen in jobs as they are released from the armed forces. We felt that the "rehabilitation member" of each local board might be greatly aided if he could turn to a local industrial medical consultant for advice. Representatives of Selective Service headquarters were affable but not interested in engaging in any such action at that time.

—From the report of the Commission on Industrial Health and Hygiene, DR. CHARLES-FRANCIS LONG, Chairman, in *Pennsylvania Med. J.*, September, 1945.

For Medical Services

THE Industrial Commission of Ohio disbursed $3,412,675.00 for medical services to injured Ohio workmen during 1944, according to a recent report of H. H. Pickering, Supervising Actuary. Included in that figure is a relatively small amount for dental services. Other

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expenditures during the year included $1,914,454.49, hospital care and nursing; $123,611.99, funeral expenses, and $67,332.68, court costs, a total of $5,518,074.76. These amounts include payments covering treatment of injured private and public employees as well as similar costs on occupational diseases, and are in addition to death awards and compensation to injured workmen. Comparative figures for 1943 were as follows: $3,457,727.45, medical services; $1,801,325.00, hospital care and nursing; $130,821.34, funeral expenses, and $97,001.18, court costs, a total of $5,486,874.97.

—From *Ohio State Medical Journal*, 41:11, 1042, November, 1945.

Workers' Malady

AN 18 YEAR old girl brusher at a raincoat factory complained of illness and watering eyes one morning while at work on an Army order. In the afternoon she felt worse and went to the rest-room where she was found unconscious a short time later. An ambulance was called and she was rushed to a nearby hospital where she was admitted in a coma. After treatment, she came to with a severe headache. The next day another young girl brusher fainted on the job. The fainting spell was followed by a convulsion. She was taken to the same hospital. The admitting physician found her mentally confused and complaining of a headache. In both cases physical examination revealed no pre-existing condition which might have been the cause of the trouble. The Division immediately sent a physician and a chemist to the plant to conduct an investigation. Air tests showed a high concentration of vapors of acetone and butanone in the air of the workroom where the brushers were employed. These substances were used as solvents for resins applied with a brush to waterproof the seams of Army raincoats. As acetone and butanone are not only toxic but highly inflammable this workroom crowded with small tables and filled with racks of coats giving off fumes represented a dangerous fire hazard. A spark from a cigarette could have started a fire which would have swept rapidly from coat to coat and any attempt on the part of workers to escape would have caused large numbers of the coats to fall off the hangers on top of them. Although fire exits were provided at both ends

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of the room, the stage was set for serious panic and great loss of life. The escape of vapors into the workroom from uncovered barrels and other solvent containers was called to the company's attention, and it was asked to repair leaky machines.

—*Industrial Bulletin*, Monthly News Magazine, New York State Department of Labor, September, 1945.

Pennsylvania

COMPENSATION and occupational disease benefits have been increased approximately 17% in Pennsylvania in the last two years, Governor Edward Martin said today. The Governor listed the enactment of liberalized compensation laws as one of the highlights of the Commonwealth's recent accomplishments in the labor and industry field.

—*Philadelphia, Pennsylvania, Inquirer*, October 21, 1945.

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TO provide an organization, not for pecuniary profit, in which all agencies and societies, both medical and lay, concerned with the problems of industrial health can hold membership and can meet together in conference for the study, discussion and careful consideration of all industrial health problems and procedure; to engage in scientific research to determine the cause, nature, prevention and cure of diseases and injuries of occupations; to assist in establishing and supervising industrial health clinics to serve small industries; to establish and maintain hospitals which will furnish facilities for the care, treatment and study of occupational injuries and diseases; to make surveys of industrial medical services and recommendations for their improvement; to solicit, receive and administer funds for any purpose that will advance and/or improve industrial health; to establish undergraduate and/or post-graduate courses in industrial medicine and surgery and/or to cooperate with medical schools and industries in maintaining such courses; and to use all those means, which from time to time, may seem wise, for the advancement of industrial health

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COMMENT and OPINION

Fatigue

THAT prolonged hours alone do not tell the whole story of fatigue is pointed out by JOSEPH L. FETTERMAN, M.D., Major, Medical Corps, United States Army. In *Medical Clinics of North America*, DR. FETTERMAN states that the atmosphere, both physical and social, in which the employee works is important. The employee-employer relationship, provisions for safety, adequate rewards, incentives to work, all decide or determine the amount of staying power of the worker and his output of finished products. "The workmen who dislike the kind of work they are doing, who are in a state of fear and tension because of the hazards of their work, those who accumulate a growing resentment against their employers, such men and women readily become fatigued. Pent-up resentment and unexpressed hostility toward employer consume energy, lessen the benefit of rest, lead to earlier exhaustion."

—JAMES W. BARTON, M.D., in "Your Health" column, *Chicago Herald-American*.

Aural Egotrauma

ARE YOU an exhibitionist? A social wallflower? A chip-on-the-shoulder person? If you are any of these things perhaps your deviation from the norm can be traced to impaired hearing. Many educational leaders, says the Sonotone research laboratories, agree that aural defects cause more aspects of egotrauma (injury to the personality) than shortcomings in any of the other senses. Some persons with hearing impairment will become shy and disinclined to make friends. Others may become aggressive and pugnacious. Over a period of years, it is asserted, uncompensated impaired hearing may bring about great changes in the pattern of personality.

—Sonotone Research Laboratories Release, October, 1945.

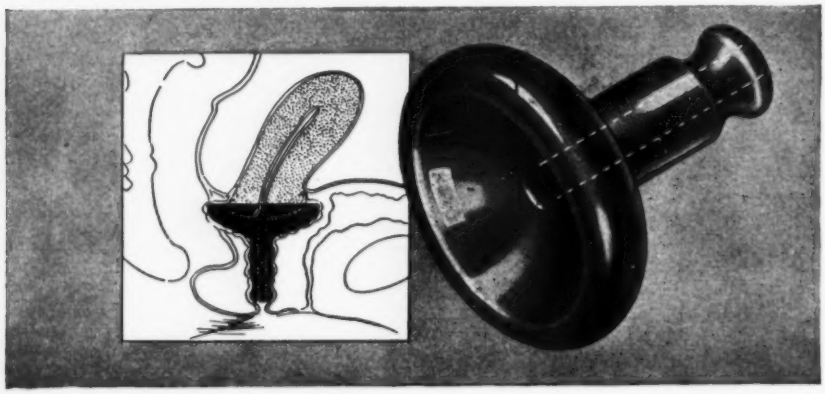
The Common Cold

ONE hundred million working days are lost to American industry each year on account of the common cold, reports JOSEPH H. KLER, M.D., and the cost is somewhere between a half and two billion dollars annually. This expensive nuisance is also one of the most mysterious, since little is actually known about its exact cause, its prevention and its cure. Of course, almost everyone has his particular system for beating a cold, but the statistical analysis prepared by DR. KLER explodes some of the favorite theories. For instance, DR. KLER finds that smoking has very little effect on colds; staying home when a cold breaks has no apparent effect on the duration of a cold (although it is certainly easier on your working associates! DR. KLER reports, however, fewer colds in air conditioned plants, and confirms that more colds start in draughty places. Posture is important, too, as people who walk about during their work contract fewer colds than those who sit all day. Women have more colds than men and they are severer, but the incidence in both men and women decreases with age. Strangely enough, more colds start on Monday than any other day in the week, particularly among men. (Perhaps this isn't so strange after all, since fatigue seems to be a factor in lowering resistance.)

—Office of Pharmacal Information; in *West Virginia Med. J.*, November, 1945.

The Philanthropoids

ONE of the favorite arguments just now of the philanthropoids (De Casseres' term for the folk who devote their lives to "doing good" to their fellowmen with other people's money) in behalf of compulsory sickness insurance is to the effect that such insurance is analogous to compulsory education. That it is not analogous is made clear by Professor Smillie of Cornell University (*J.A.M.A.* 128:1005, August 4, 1945). Our compulsory educational system was not imposed on us from above by the federal government, on a nationwide base. Moreover, "It has maintained the basic feature of local autonomy and local community determination of policy. State standards have been of great value in the improvement of the system. State subsidies to less favored communities are an essential part of the plan. The Federal government has been of



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Drainage hole in stem is outstanding advantage

Instead of the solid stem, the Emmert-Gellhorn Pessary employs a stem having a hole drilled through its length. This offers the advantage of drainage, preventing accumulation of dammed-up secretions, and the consequent need for fewer removals of the pessary for cleaning—of great benefit to the aged patients who find such frequent manipulation and visits to the physician a severe handicap. The stem of the new pessary is ¼-inch shorter than that of the former pattern, and eliminates the knob formerly used. A slight hollowing of the stem near the end, however, allows easy grasp for removal. In weight, the Emmert-Gellhorn Pessary has the advantage of being considerably lighter. In the most used size, 2½ inches, it weighs 57.5 grams, whereas the same size Gellhorn pessary weighs 65 grams.

8E5162A—Emmert-Gellhorn Pessary, diameter 2 or 2½ inches, state size, each..... $2.25

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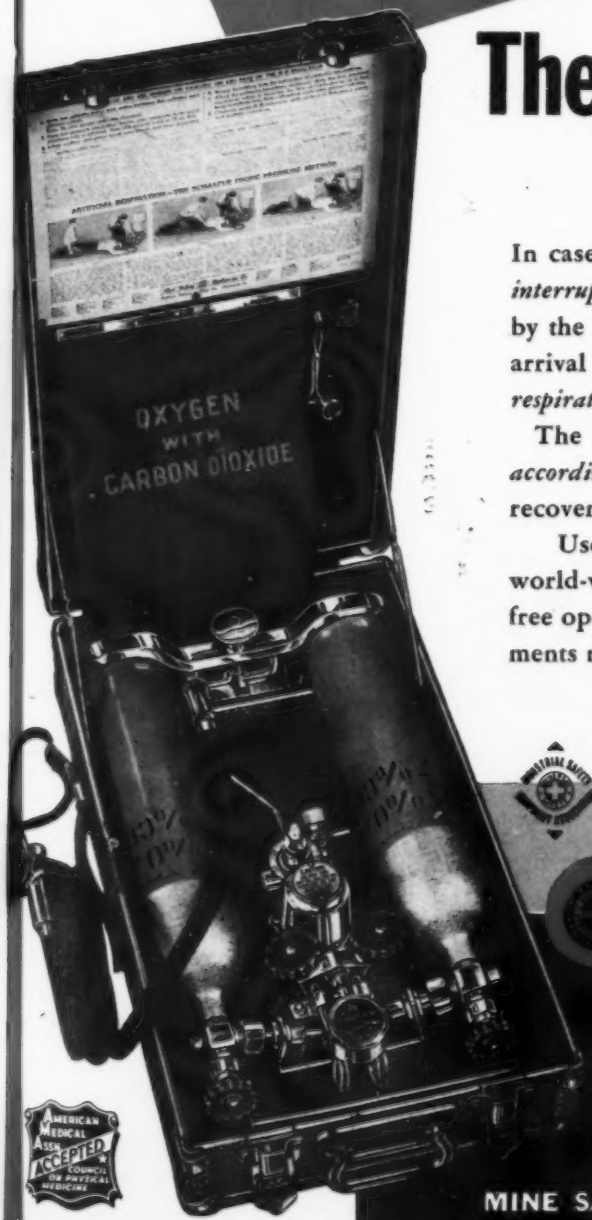

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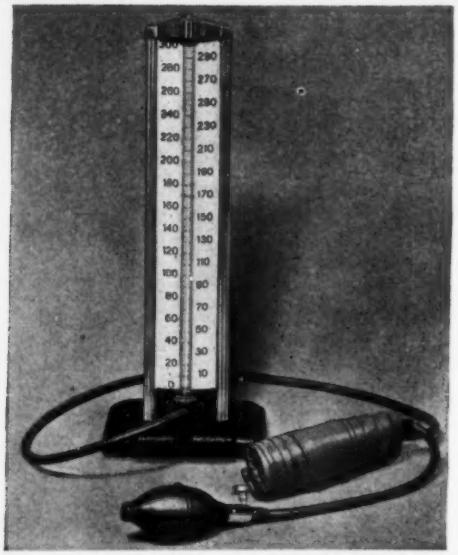

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assistance in promotion of nation-wide standards of education. But the principle of local community responsibility for schools is the very keystone of the plan, whereas a federally sponsored and administered plan would be certain to fail."

—Editorial, *Medical Times*, October, 1945.

"Who You Were!"

ON THE employment front there is the story about the businessman who wrote a Federal agency asking for a job. Later a friend got him in the agency and he answered his own letter explaining he didn't have the qualifications for the job. . . . The Bureau of Mines for many years has recommended that miners carry metal checks or discs while working underground for identification purposes in case of a mine disaster. Many operators of the nation have adopted such a system for company employees, as well as for visitors. Recently, a Washington, D. C., Bureau employee, about to go underground at a coal operation near Pittsburgh, was handed such an identification check by the mine foreman, who summed up the checking system adequately with: "That's to tell who you were, brother, not who you are." P.S. He came back.

—*Personnel Administration*, June, 1945.

Orchids to Winder

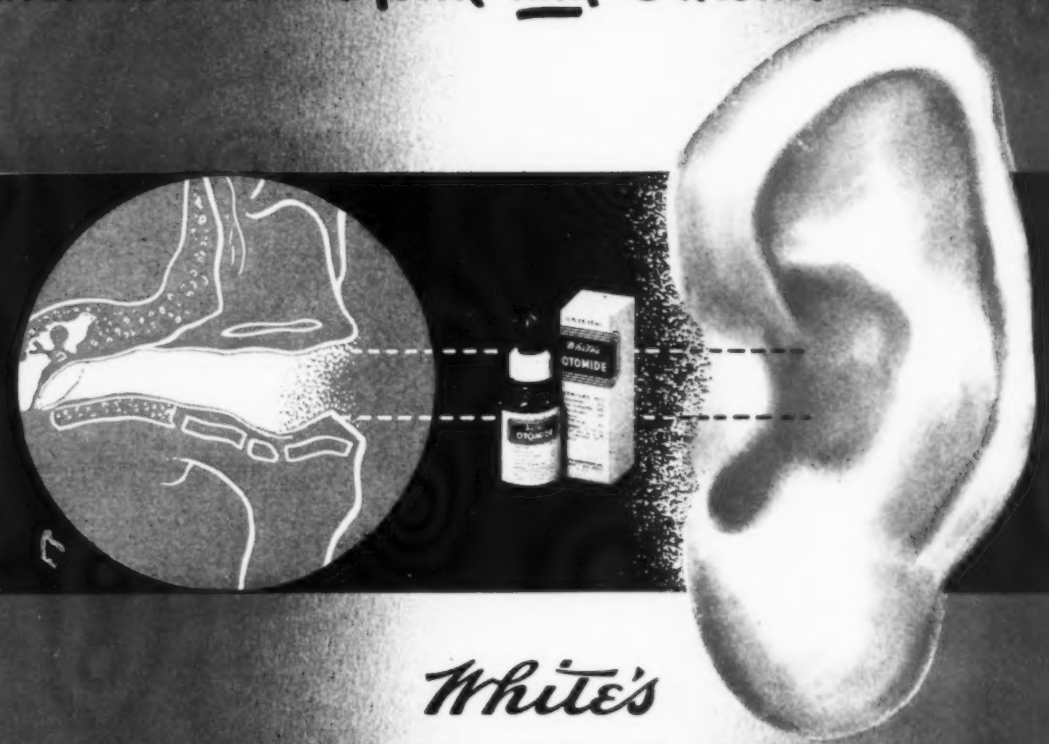
BEFORE signing off, we would like to ask the Winder Manufacturers Health Clinic, in Winder, Barrow County, Georgia, to take a bow. The six firms of this town, manufacturers of pants and furniture, have banded together to establish a central clinic to care for their 1500 employees. This clinic is in charge of EUNICE CHAPMAN, a registered nurse with a health education background, who conducts physical inspection of all employees, trains first aid people in each firm and sees that pre-placement blood testing is carried out. Winder now has the services of only one physician to whom referrals are made when necessary. However, with the prospect of the release of physicians at the end of the war, the six firms of Winder are already planning to replace their cooperative clinic with an up-to-date health center. This center as now conceived, will include a model cafeteria where the town's employees may benefit from a balanced diet. The achievement in the little town of Winder, sponsored and nurtured by the Georgia Industrial Hygiene Service and especially by DR. L. M. PETRIE, director of that department, is a working realization of the dream of DR. VICTOR HEISER and others who have long been advocating such cooperation by small firms in larger cities.

—From "Notes on Industrial Cooperation," by PERCY SHOSTAC, Consultant on Industrial Cooperation, American Social Hygiene Association, in *Journal of Social Hygiene*, June, 1945.

Plant Doctors

INDUSTRIAL health services have been a vitally important factor in keeping workers in the best physical condition possible so that critical material could be supplied to our military forces, DR. FRANK T. OBERG, plant physician at the General Electric Company, said today. "Safeguarding the health of employees is recognized as of prime importance and the program of industrial health is built around this idea. There have been many new developments in industrial medicine in recent years. No longer is the industrial doctor concerned only with first aid to the injured. He must now be prepared to do much more than this. It is all-important to protect and guard the health of the workers, which includes elimination of industrial health hazards, the control of communicable diseases, and other factors concerned with the individual's welfare. The doctor works with the safety man, the engineer, the chemist, and others to set up safe standards of operations and methods for using various materials and substances in such a manner that the workers' well being is protected. To combat contagious diseases, preventive measures are taken to avoid epidemics. The water and sanitation have to be checked so that drinking water is safe at all times, and the disposal of waste material is carried out in a proper way. All these activities are related to community health, and the industrial doctor maintains good relations with the local and State Boards of Health." DR. OBERG pointed out that "most industrial plants require a complete physical examination when a person seeks employment. This is done primarily in the interest of the prospective worker to aid in determining his capabilities. This ex-

EFFECTIVE IN BOTH *Acute and Chronic* EAR INFECTIONS



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Antibacterial Potency—even in the presence of pus.

Stability—a *stable* sulfonamide-urea solution.

Wide Field—effective in *BOTH* acute *AND* chronic middle and external ear infections.

Well Tolerated—physiologic pH—virtually obviating local irritation.

Analgesia—effective chlorobutanol analgesia *without* impaired sulfonamide activity.

FORMULA

Sulfanilamide	5%
Carbamide (urea)	10%
Chlorobutanol	3%
Glycerin (high sp. gr.)	q. s.

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In the recent disaster when an airplane crashed into the Tower of the Empire State Building, a hospital apprentice of the Coast Guard raced up the stairs to the 78th floor of the building carrying a suitcase of medical supplies. There he administered first-aid to many of the injured. It took a strong heart to stand the strain of a 78-story climb.

Unusual exertion like this would, unquestionably, be dangerous to many of us who lead sedentary lives and get out of condition. Frequent physical examinations are a postwar necessity. No such examination can be considered complete without an electrocardiogram.

In selecting his electrocardiograph for making these tracings, the discriminating physician demands accuracy, dependability, wide acceptance of records, convenience of use and ruggedness. When all of these factors are considered, the choice is inevitable . . . CAMBRIDGE.

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amination includes visual tests to check on his eye condition, blood pressure, heart and lungs, blood examination, chest x-ray, urinalyses, and a general physical examination. When the results of these tests are evaluated, a person may be assigned to the type of work for which he is physically fit and thereby many accidents are avoided. Periodic physical examinations are given workers on certain jobs to determine that their health remains good and that no ill effects from working with various materials and substances develop. All this is an important part of preventive medicine. As health councilor, the industrial doctor has the opportunity to teach personal health. He advises the worker on such subjects as the common cold, care of the feet and other matters of personal hygiene. At times, he is approached with a request for an examination by some one who has noted some health condition which he wishes to have checked. In this case, the worker is referred to his private physician for appropriate care. In all his dealings, the industrial doctor maintains the confidential doctor-patient relationship. Industrial medical programs continue to advance by providing necessary services. The value of careful pre-placement examinations has been proved.

—*Bridgeport, Connecticut, Post,* October 7, 1945.

Foot Ailments

MOST of the $200,000,000 spent annually by 70% of the people of the United States for treating common foot ailments is just so much wasted money, according to an article in the newest issue of *This Month* magazine. Written by an orthopedic surgeon, George H. Tichenor, the article appeals for better, more enlightened orthopedic treatments, charging that the medical profession has been apathetic to the imperative need of these improvements. Most theories about the function of the feet are wrong, the author asserts. Among these false impressions, he points out, is the general belief that the foot operates by weak or strong muscles and the concepts of longitudinal and "metatarsal" arches. "Actually," Dr. Tichnor declares, "there is no such thing as a metatarsal arch." Instead, he quotes the theories of Dr. Dudley Morton, an orthopedic surgeon who began to formulate revolutionary ideas about treating foot ailments when he was a medical officer in the army during World War I. After long years of research on foot bone structure, Dr. Morton designed two instruments for measuring foot pressures, the first of their kind, which he used to aid in diagnoses. He also was one of the first orthopedic specialists to take top-view foot x-rays instead of the once conventional side view. According to Dr. Morton's theory, bones—not muscles—are the root of most foot troubles. The five metatarsal bones share the weight of the body with the heel. "In the case of an average size individual taking a walk," the article says, "these seemingly frail metatarsal bones carry pressure amounting to about 250 tons for a single mile." Dr. Morton estimates that 50% of the body's total weight falls on the first metatarsal bone under the big toe, and he blames most foot disorders on the improper support of this bone.

In his opinion, pronated feet—a condition described as weak ankles or "falling arches"—is caused by loose ligaments in the first metatarsal bone rather than by muscular weakness. "Grecian foot"—a second general type of foot ailment outlined by Dr. Morton—is painful callous which appears when the first metatarsal bone is shorter than the second. Another form of foot discomfort may arise when the sesamoid bones, which act as bearing points under the first metatarsal, are too far back. Dr. Morton has found that all of these ills may be improved simply by treating the first metatarsal bone without the necessity of wearing steel supports or ugly corrective shoes. The surgeon believes that most incipient foot troubles are aggravated by our mode of living. By way of illustration, he points out that shoes with high heels and short narrow toes worn by women make them many times more susceptible to foot troubles than men.

Army and Navy doctors use simple petrolatum in burn therapy

War-burns have given rise to a new rationale of burn therapy. Now doctors in the Army and Navy recognize the necessity for both general and local treatment of burns. (1)

Keeping down incidence of burn-surface infection is of prime importance in local therapy. This means promptly covering the burned surfaces, under sterile conditions, with a simple, aseptic dressing of petrolatum. Debridement is frequently omitted, the procedure being simple application of petrolatum pressure dressings, left undisturbed for a minimum of two weeks unless complications develop. (1)

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is the world's leading brand of
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In treatment of burns in civilian practice, too, physicians are using dressings made with 'Vaseline' Petroleum Jelly, the world's leading brand of petrolatum. Non-injurious, non-adherent, this simple application provides the doctor with a convenient, effective covering-treatment of established merit.

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1. Am. J. Surg. LXVII:1: 1-2 1945

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LOW SYSTEMIC ABSORPTION

High Local Concentration: One pleasantly flavored Sulfathiazole Gum tablet chewed for *one-half to one hour* promptly provides a high concentration of locally active sulfathiazole (average 70 mg. per cent) *that is maintained throughout the chewing period.*

Low (negligible) Systemic Absorption: Blood levels of the drug, even when maximal dosage is employed, are almost negligible—rarely reaching 0.5 to 1 mg. per cent.

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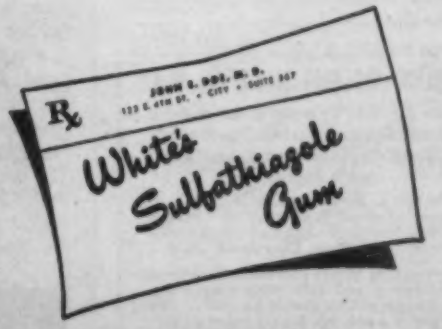

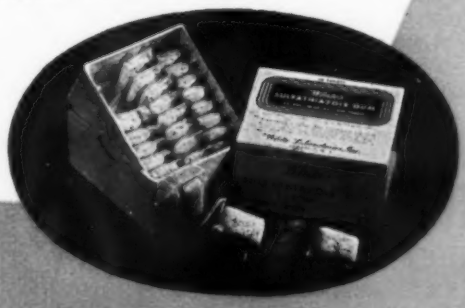

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Basic Training Program

LEONARD G. ROWNTREE, M.D.; Colonel, Medical Reserve; Chief, Medical Division, National Selective Service System; Chairman, Joint Committee on Physical Fitness, "The Coming Age of Industrial Medicine," published in *Journal of the American Medical Association*, 129:9, 595-600, October 27, 1945. Extract: "The need for a basic training program for industrial health personnel: Nor must one forget that the whole program for the improvement of industrial health will require a definite educational program. This will have to take the place of our very incomplete and fragmentary efforts at the present time in providing systematic facilities for instruction in modern health industrial methods both before and after graduation. Such instruction will have to be a part of the curriculum of the school for the undergraduate. Provision will have to be made also for advanced systematic study in bona fide graduate instruction as well as continuing postgraduate instruction for the doctor engaged in practice. In a report by committees representing the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and the Council on Industrial Health of the American Medical Association, the need for a unified plan is expressed 'which assigns overall responsibility for coordinated classroom discussion, field studies and laboratory and section work to one single teaching division, preferably preventive medicine and public health. There must always be considerable dependence on clinical teaching in the medical and surgical aspects of industrial practice, but the testimony of recent graduates clearly indicates that older methods of divided and unrelated instruction fail to provide dependable and reasonably complete information.' The same committee emphasizes the need to teach the administrative aspects of industrial health organization in plants, factories, mines and stores. It outlines two additional aspects of the content of instruction to be given as (1) industrial hygiene and toxicology and (2) industrial medicine and traumatic surgery. In the former, emphasis will be placed on prevention as a cardinal principle for reducing the incidence of disability in industry. In the second phase the object will be the 'full restoration of the injured worker to his former earning capacity in the same line of work and without unnecessary delay.' The whole program will promote industrial efficiency, increase earning power and establish cooperative, industrial relations. All of these will contribute to the most effective organization of the labor force and make available manpower serve more effectively the public interest and promote the common welfare."

Cotton Dust

DR. PHILIP DRINKER, Professor of Industrial Hygiene, Harvard University School of Public Health, "Atmospheric Conditions in Cotton Textile Plants—A Study of the Division of Labor Standards, United States Department of Labor," in *Textile Bulletin*, 69:3, 17-22, October 1, 1945. Abstract: "There is a certain loss of social caste, apparently, from working as a cotton mill operative—at least we have been so informed in both the North and South. Workers, especially women, dislike coming out of mills with wisps of cotton fiber on their hair. Medical care, rest rooms for women, and a place where workers can go have a smoke, modern cafeterias, wash rooms and toilets are below the standard one finds in new industries such as aircraft manufacture and in rayon and nylon mills. Admittedly the cotton industry has recently been through some very lean years and money for anything but the bare essentials of manufacturing existence has been scarce. We hold no brief for the reliability of prophets, but we agree with them that the cotton industry will be faced with ever increasing competition from other industries, including synthetic textiles, and that its working conditions will have to be improved. Nevertheless, it should be recognized that health records in the cotton textile industry are good. There is nothing inherently unhealthful about the industry save for its tendency to allow somewhat dusty conditions in certain processes, and hot atmospheric conditions in

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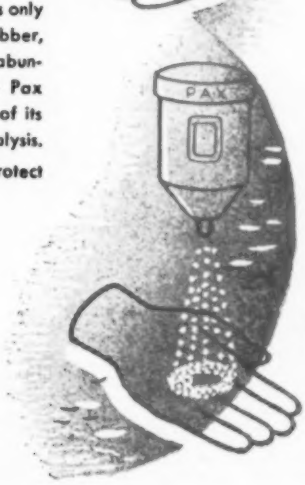

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others. Just how much these conditions contribute to labor turnover is not determinable today because of the artificiality of labor stabilization which has been enforced by war conditions."

In Sheep's Clothing

H. SHERIDAN BAKETEL, M.D., editorial in *Medical Economics*, August, 1945. Text: "Bill in Sheep's Clothing: Apropos of the new Wagner-Murray-Dingell bill is the warning that 'things are not always what they seem.' Although the measure is as thoroughly un-American and unacceptable as its predecessor was, infinite pains have been taken to disguise that fact. Mr. Wagner lays careful stress, for example, on the 'free choice' of physician which his bill promises the patient. Actually, choice would be limited to participating doctors; and many of the best men would probably not be participants. The measure offers practitioners their choice of payment on a fee, capitation, or salary basis. But they have no assurance that this choice would be preserved. The trustees of the system (none of them physicians; all currently left-wingers) are accorded such sweeping powers by the bill that to maneuver participating doctors out of the fee method of payment into a salaried status would be no trick at all. Some objections to the old Wagner-Murray-Dingell bill are admittedly lacking in the new one. Some constructive features have been added. But these, for the most part, concern details of the legislation. All the fundamental defects remain. The framers of the super-social security bill make it appear that the additional cost burden of expanded benefits would rest equally on employers and employees. But those who count on this are due for a shock. Employers generally would carry on at the existing rate, paying 4% on wages up to $3,600 —the same rate paid now for unemployment and old-age benefits on wages to $3,000. Employees, on the other hand, would be taxed 4% on wages to $3,600 or four times the existing 1% on wages to $3,000. Self-employed persons—e.g., physicians—would find their incomes slashed even more drastically. Ineligible for unemployment and temporary disability insurance, they would still be taxed 5% for the other benefits. Unprecedented as these tax rates seem, they are but forerunners of higher ones to come. The cue to the ultimate cost of the Wagner-Murray-Dingell program is found in the prospect of either (1) increased individual contributions or (2) Federal contributions from general revenues or (3) both. The bill's chances of passage this year are slight. Odds are higher on enactment in 1946. Meanwhile, for the counter-offensive, an informed profession is a 'must.'"

Industrial Mental Hygiene

JOHN W. CRONIN, Senior Surgeon, BRUNO SOLBY, Surgeon (R), and WINFIELD S. WILDER, Senior Assistant Surgeon (R), U. S. Public Health Service, "An Industrial Mental Hygiene Program for Federal Employees," in *Public Health Reports*, 60:45, 1323-1336, November 9, 1945. Conclusions: "The introduction of mental hygiene programs into industry results from the conviction that the benefits from such programs will accrue to both production and performance as well as to the well-being, physical and mental, of the members of our nation. This extension of mental hygiene measures beyond the traditional limits of the medical field of action, into the realm of personnel administration, points to vistas of mental health for our adult productive population that could hardly be conceived at the beginning of this century. The role of the psychiatrist in such a program adds to his function as physician the function of an educator. The role of the supervisor expands from his function as a production manager to include the function of a leader of those for whose productivity he is responsible. In addition to the preventive aspects of such a program, an unexplored field of psychotherapy is opened, with possibilities reaching beyond the present-day methods of psychotherapy. This concept of the role of psychiatry in industry is, however, not to be interpreted as taking the place of efficient personnel management and supervision. It offers a new orientation as basis for methods which personnel management will develop."

Psychiatric Aspects

C. CHARLES BURLINGAME, M.D., Hartford, connecticut, "Psychiatric Aspects of Veterans Re-employment," in *Connecticut State Medical Journal*, 9:11, 836-839, November, 1945. Extracts: "Along with the rest of the nation, industrialists read in the news-

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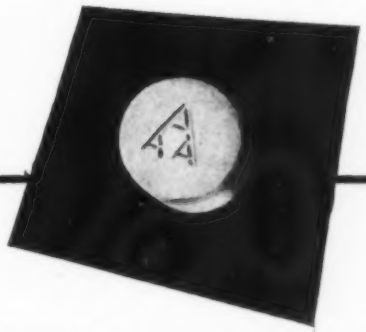

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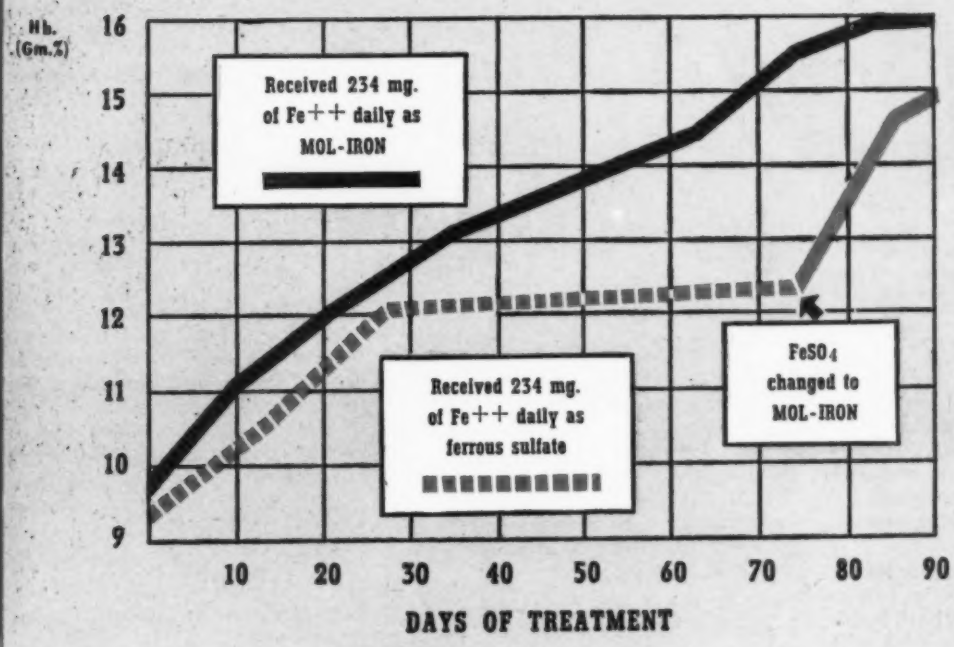

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*Neary, E. R., Preliminary Evaluation of Molybdenum-Iron Complex in Hypochromic Anemias of Pregnancy, to be published.

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papers that the year 1944 would produce a million neuropsychiatric cases from the armed forces. They also read that industry would be required by law to reassimilate these people, and along with so many others, the industrialists began to get a little jittery. As a result, I was called in to determine ways of protecting industry's equipment, and of protecting industry's employees, particularly the presidents, from having their heads shot off by some lunatic soldier discharged from the armed services. I confess I started in with the assumption that there was a tremendous problem. I spent approximately a year investigating little industries employing 200 to industries employing 100,000 or more, but I had not gone far before I began to have some difficulty in finding any problem. With a little study, it became quite evident that if a veteran came home, and punched somebody or went berserk, or something of that kind, it was front page news. Similar things have been going on at least since I became a psychiatrist, and that was 37 years ago. In the past, they would sometimes make the front page, but in the larger cities, they were usually relegated to the back pages, or were not printed at all. The differentiating factors during war time were that the individuals were veterans, and a psychiatric panic had just passed over the country; therefore, the stories were 'good' news. I endeavored to discover just how such occurrences compared in proportion to the expectancy in civilian life. It was a difficult thing to determine, but I distinctly obtained the impression that these overt acts of some service people were no greater than had been occurring in civilian life. The only difference was that the service people had the distinguishing mark of being a specialized group. . . . I say the following advisedly: You have read in the papers about half a million military psychiatric cases, but based upon civilian standards, the psychotic or frank mental breakdowns in this war have been less, on a percentage basis, than in the same age group in civilian life. Just think that over, disregarding the nebulous psychoneurosis, escape mechanism, or whatever you wish to call it. Why don't we see those facts spread over the newspapers? Why isn't that news? I am far more impressed with the ability to take it and the stamina shown by our armed forces, than I am by these stories about the mass of mental breakdowns. I am very tired of hearing that our men are coming back knocked to pieces in body and mind, that they are all going to be wrecks, and need to be adjusted. I am tired of hearing that every wife should be buying books and taking some courses in psychology, that she should take a telescope to see her darling come down the line, look through the telescope, and see whether the hind leg isn't swinging a little differently. Of course, it's swinging differently! He is more of a man than when he went away! If we turn the telescope on the wife, she probably couldn't stand it half as well as he could, so let's get back to sense."

Backache in Industrial Injuries

MERRITT L. JONES, M.D., Wausau, Wisconsin, 'Backache in Industrial Injuries," in *Wisconsin Medical Journal*, 44:11, 1069-1070, November, 1945. Text: "Injuries to the back and their evaluation from an industrial angle have always been a most difficult problem to the clinician. From an anatomic and developmental standpoint, the spine is such an exceedingly complicated structure that the average physician possesses only limited knowledge as to the details of its architecture and mechanics. N. S. Davis, in speaking of backache, stated, 'The multiplicity of causes, the inability to measure accurately its severity and the indefiniteness of its localization make backache the symptom that is most difficult for the internist to properly evaluate, even when the complication of trauma does not exist.' It should be remembered that backache is a symptom and not a disease. There have been many classifications of back pain. Perhaps the simplest of these and one which can serve as a working outline, is the division of such cases into three groups: (1) those due to functional disturbances; (2) those caused by referred pain; and (3) cases of essential back pain. In the first group we have those patients suffering from emotional disturbances, such as hysteria and the neuroses, as well as those who are malingering. The second group includes patients with static backache and various diseases of the internal organs. In the third group we have the traumatism, congenital and growth disturbances, infectious conditions, and various types of tumors.

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References: 1. West. J. Surg., Obst. & Gyn., 51:150, 1943. 2. Clin. Med. & Surg., 46:327, 1939. 3. Am. J. Obst. & Gyn., 46:259, 1943.

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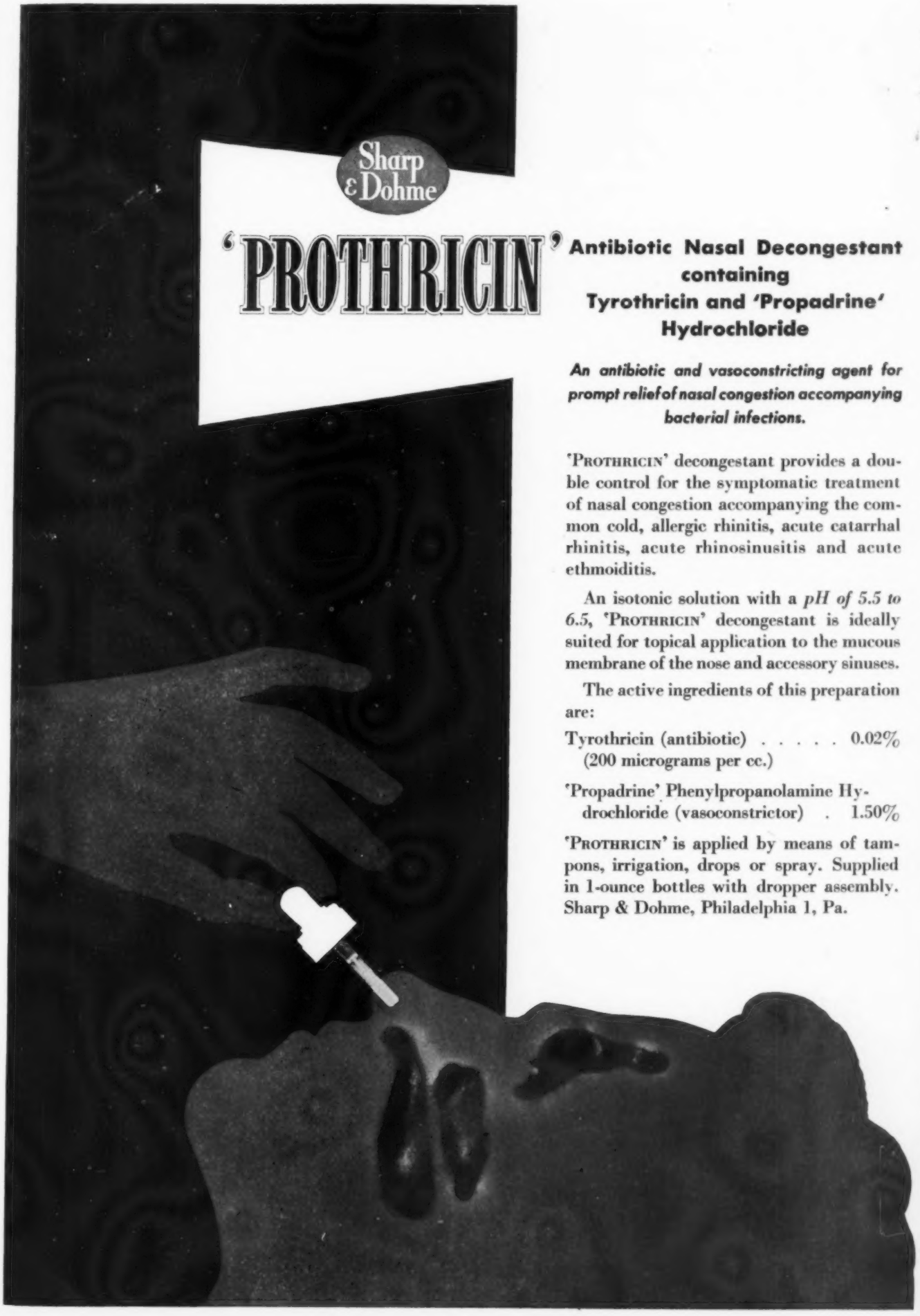
Evaluation of Patient Necessary: In cases where compensation is a factor, many patients present histories and allege symptoms which tend to be misleading and to further obscure the picture. Given a patient with back pain, it is obvious that a detailed history and meticulous physical examination are imperative, if we are to arrive at a proper diagnosis. We must not only observe the evidences of actual injuries to the back but we must also evaluate the patient himself; in other words, we must try to ferret out those with true back injuries and separate them from the malingerers, as well as those patients whose complaints are of emotional origin. *Importance of Roentgenograms*: In the examination of the actual lesions of the spine, accurate roentgenologic interpretation cannot be overemphasized. The normal anatomy of the part under examination should be familiar to the examiner. Changes incident to growth, posture and occupation, as well as changes incident to age, should be noted and evaluated. The exact character of the changes as to whether they are localized or general, whether they are primarily of bone, cartilage, or soft tissue and whether they are constructive or destructive in nature, frequently leads to the correct diagnosis. The wide variety of congenital lesions seen in the spine is a common source of error in diagnosis by those not familiar with these conditions. I refer particularly to various changes in the facets, fissures, wedge-shaped vertebrae, etc. All the joints in the body are subject to the wear and tear of daily life and the spine is no exception. Gravity, leverage, and the upright position produce many changes in both the bony and the cartilaginous structures. This has been amply demonstrated by the work of Professor Schmorl as far back as 1927. Many cases of back pain, due to such changes, are erroneously laid at the door of industry. The great majority of back injuries encountered in industrial work are not of the severe type. They are usually disabilities of the lower back, produced by lifting, sudden twists, or unguarded movements. In spite of this, many cases are followed by prolonged, and often unexplained, disabilities. Recovery from such strains and sprains should occur as does recovery from similar injuries in other parts of the body, and should be commensurate with the recovery noted in similar cases not of industrial origin. It is important that the physician carry such patients along with considerable confidence and optimism. The treatment in general varies from simple measures such as physiotherapy, adhesive strapping, various braces, internal medication, etc., to the more radical types of therapy, including operative procedures. The method by which such patients are returned to work is frequently of extreme importance. One could say that the duty of the employer should not, and does not, end with the payment of compensation. Many patients, if returned to work carefully and under observation, can gradually be made to assume duties that would otherwise be impossible, and even though badly disabled, can often ultimately return to their former positions. Those cases which ultimately appear before the industrial commission are controversial in nature; otherwise they woul not appear for hearing. The physician, in dealing with these cases, must be ever cognizant of the fact that he has a responsibility to the patient, to the employer, and to the industrial commission itself."

Value of the Laboratory

LOUIS W. SPOLYAR, M.D., Director, Division of Industrial Hygiene, "Value of the Laboratory in Industrial Medicine," in the *Monthly Bulletin Indiana State Board of Health*, August, 1945. Text: "The present day concept of industrial medicine would not exist if it were not for the rapid development of industrial laboratories and definitive analytical methods. Today we consider industrial medicine as specialized practice engaged in the *prevention* of occupational diseases and injuries. The entire emphasis is on the preventive aspect of disease control rather than the curative aspect heretofore considered as the chief function of industrial medicine. Obviously if occupational diseases and injuries can be prevented, the treatment of such diseases and injuries is unnecessary. With this concept the industrial medical practice becomes one of *industrial medicine* and not *industrial surgery*.

"Occupational diseases can be and are prevented from occurring. Definite methods toward the accomplishment of this end have been developed by



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industrial physicians, engineers and chemists. One of the most important tools in the development of preventive medicine is the industrial laboratory.

"The laboratory supplies the physician, engineer or governmental agency with specific data as to what the hazardous material may be, the exact amount of the material present in the worker's environment and through biological tests, the type of injury the material may produce in an experimental animal if data of this type is lacking. New compounds are continually put through this pace in order to determine if workers will be injured during their normal working contact with the new compound or chemical.

"Armed with such data and with the knowledge of the 'safe limits' for various metals, dusts, gases, solvents, or dermatitis producers, one can readily and intelligently put in effect a control program for the prevention of diseases in industry. These safe limits are again a product of the laboratory, for through laboratory determination, animal experimentation plus correlation of the laboratory findings with physical examinations, safe limits are defined.

"To reduce the atmospheric concentration of the various hazardous materials that may be present in the workers' environment to a safe concentration the industrial hygienists may use any of the following methods:

"1. Substitution: Through this technique a nonhazardous material is substituted for a hazardous one. To control the silicosis in sand blasting one may, for example, substitute the use of steel shot for sand.

"2. Wet methods: Keep dust under control by use of a water spray or jet.

"3. Enclosure: Completely enclose and exhaust process, and thus prevent the escape of the noxious gas or hazardous dust.

"4. Local exhaust: Through mechanical means remove the gas, fume, mist or dust from the workers' environment.

"5. Redesign the operation: It may be possible to eliminate the hazardous process by revamping the line of flow. For example, to eliminate a diazo dye dermatitis hazard among spinners one plant engineer eliminated the dyeing process at the spinning frame and had the cloth dyed after spinning.

"6. Personal protection: If it is impossible to use any of the above methods, then the worker may be furnished a respirator, protective clothing or other personal protective equipment.

"In addition to the laboratory determinations the chemists in this type of work must develop and use specialized and sensitive apparatus in the field to collect their samples for future analysis. Field sampling involves the use of dust collectors, such as the Smith-Greenburg impingers and electrostatic precipitators, carbon monoxide, benzol, hydrogen sulfide and combustible gas indicators as well as numerous other gas, mist and fume collectors.

"Such laboratories must use precise, delicate and tedious methods of analysis, for at best they are trying to determine the existence of very small quantities of matter. Their results are never measured in grams, ounces or pounds, but in millionths of a gram or in so many parts per million parts of air. Such precision requires specialized expensive apparatus and laboratory facilities, plus skilled, highly trained laboratory personnel. The expense involved is great, but the number of lives saved, diseases prevented and decreased cost of compensation far outshadows, financially or otherwise, the initial cost. Preventive medicine is good business, for it saves employers dollars and cents through increased production, decreased absenteeism, decreased compensation, medico-legal costs and increased employee morale.

"A solitary example will suffice to illustrate the statements made thus far. A small Indiana plant, through a subcontract, developed an operation whereby this plant would 'flange' a piece of pipe for the prime contractor. To 'flange' the pipe it was heated with a blow torch in a spinning lathe, and when the end of the pipe became red hot it was 'flanged' or beveled by use of a jig. During this operation five men became violently ill with a chest disease, and within five days one man died.

"Our laboratory quickly informed us that the pipes were coated with cadmium. Knowing this we could reconstruct the 'accident.' The blow torch volatilized the cadmium to a fume which the workers inhaled. Cadmium produces a chemical reaction in the

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lungs resulting in the liberation of great quantities of body fluids into the lung, and the worker may drown himself in his own body fluids. This did occur in the worker that died. The safe level for cadmium is one milligram of cadmium per 10 cubic meters of air. Knowing this, the engineers designed an exhaust system so that all fumes would be pulled away and not inhaled by the workers. Through this method the cadmium content of the air was reduced to the safe level and production went on.

"Industrial medicine owes much to the industrial analytical laboratory. Without such services we would still be treating occupational diseases and injuries — just helping the worker along between diseases—and not preventing such diseases from occurring. Thus industrial medicine will progress, more diseases will be prevented if such laboratories become more numerous, have more specialized equipment and personnel and develop methods to measure almost infinitesimal amounts of a given compound or element. These laboratories really constitute the cornerstone of industrial medicine as we know it today."

Toxicity of Molybdenum

LAWRENCE T. FAIRHALL, Principal Industrial Toxicologist, ROBERT C. DUNN, Surgeon, (Pathology Laboratory), NORMAN E. SHARPLESS, Assistant Chemist, and E. A. PRITCHARD, Laboratory Technician, Industrial Hygiene Research Laboratory, National Institute of Health, "The Toxicity of Molybdenum," in Public Health Bulletin No. 293, U. S. Public Health Service, 1945. "Summary and Conclusions: Molybdenum trioxide, calcium molybdate and ammonium molybdate when fed to rats and guinea pigs in large doses of from 1,200 to 6,000 milligrams of molybdenum per kilogram invariably proved fatal. The fatalities were much less in animals fed 120 to 600 milligrams of molybdenum per kilogram. There were no fatalities when amounts as great as 6,000 milligrams of molybdenum as molybdenite per kilogram of body weight were ingested. The inhalation of the dust of molybdenum trioxide, calcium molybdate dust and molybdenum trioxide fume at an average concentration of approximately five milligrams of molybdenum per cubic foot of air proved injurious. No fatalities occurred in animals subjected to molybdic oxide fume for 25 one-hour exposures at an average concentration of 1.5 milligrams per cubic foot of air, and only one fatality in 24 one-hour exposures of molybdenite dust at an average concentration of 8.1 milligrams of molybdenum per cubic foot of air. Intraperitoneal injection experiments indicated a high mortality rate for guinea pigs injected with soluble molybdenum compounds in amounts of from 400 to 800 milligrams per kilogram. The effects were particularly noticeable with molybdic oxide and ammonium molybdate. Analyses of the tissues of animals variously exposed to molybdenum compounds indicate that the greatest storage occurs in the kidneys and bones. Storage, however, is of a transient nature in any of the tissues. Both the absorption and the excretion of molybdenum are rapid. Measurements of the blood up-take of molybdenum showed that this begins to be apparent about 100 minutes after administration of the molybdenum compound. Measurement of the rates of solution of various forms of molybdenum trioxide show that molybdic oxide fume dissolves most rapidly, elutriated molybdenum trioxide dust much less rapidly and ordinary reagent molybdenum trioxide least rapidly. Experiments with the sodium salts of hexavalent chromium, tungsten and molybdenum have shown that sodium molybdate is less toxic following intraperitoneal injection than either sodium chromate or sodium tungstate. A careful study of the histopathologic changes produced by long continued exposure of animals to the fumes or dust of molybdenum compounds and of animals fed these substances indicates that molybdenum compounds in general are of a low order of toxicity both from the point of view of observed clinical effects as well as from the histopathologic point of view. While molybdenum is less toxic in general than several other metals of industrial importance, it is suggested that suit-

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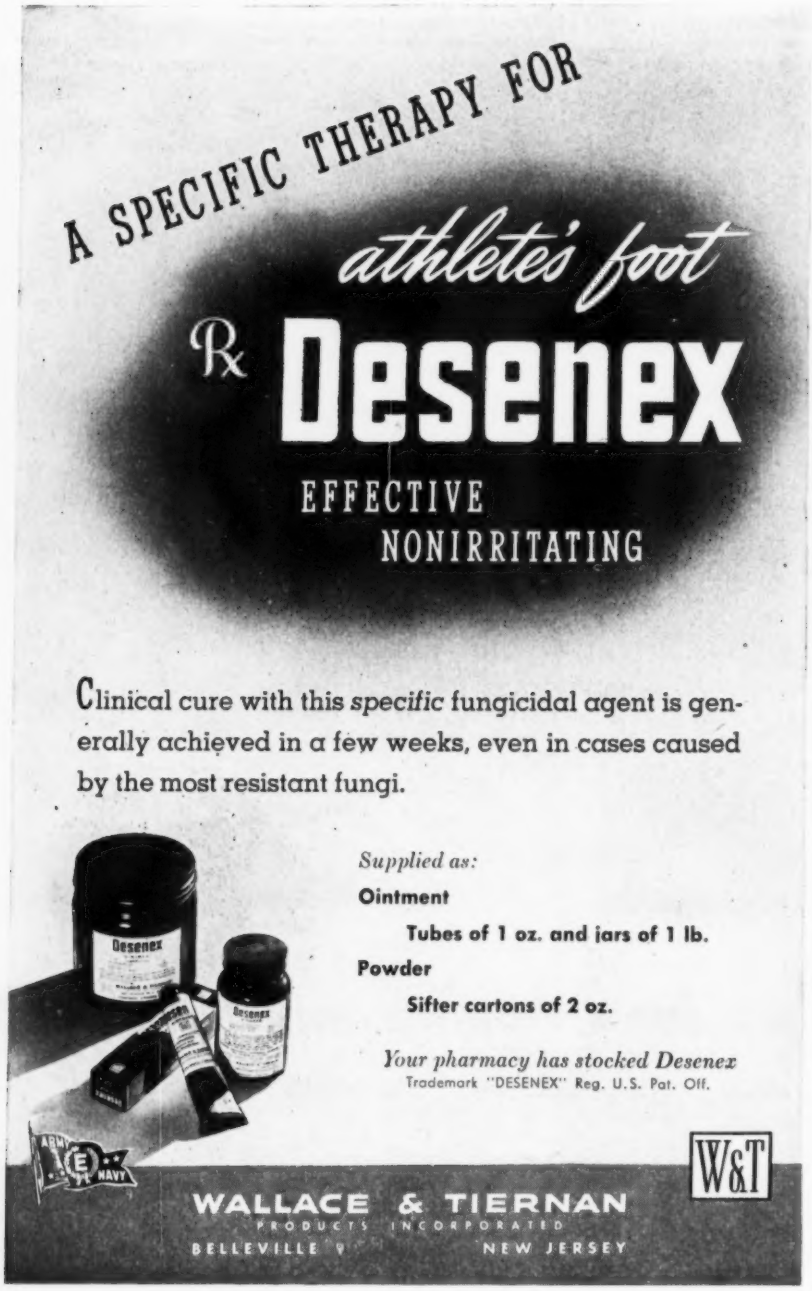
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able protection should be insured against the inhalation of any considerable amount of the more soluble molybdenum compounds. A useful means of estimation of the extent of absorption of molybdenum is indicated by examination of the blood or urine for its molybdenum content."

Aluminum Therapy

DR. JOHNS, M.D., and S. J. PETRONELLA, M.D., East Chicago, Indiana, "Aluminum Therapy for Silicosis," in the *Monthly Bulletin Indiana State Board of Health*, September, 1945. The treatment of silicosis with aluminum powder, which already in the past years has been the object of study in Canada by Denny, Robson and Irwin, and also Crombie and Blaisdell, has been recently brought in this Country under the direct supervision of Dr. J. W. G. Hannon. Thanks to the results of their studies, one can now count hundreds of cases treated.

"Denny, Robson and Irwin concluded that the disability in silicosis was due mostly to the thickened alveolar walls interfering with the normal gaseous exchange, and only slightly to fibrosis. They maintained that silica which was retained caused an inflammation in the alveolar walls while being transformed into silicic acid in the presence of body fluids. They then set about to find a nontoxic substance which would reduce the solubility of the siliceous material, and after investigating many substances found that aluminum powder inhaled by silicotic animals diminished the extent and degree of thickening.

"The next step was to determine whether aluminum, when inhaled by man, was injurious. Drs. Crombie and Blaisdell in 1939, through the courtesy of Dr. F. C. Frary, Director of Research of the Aluminum Company of America, made a study of 125 men employed in Pittsburgh by that Company. These employees had for many years been engaged in the manufacture of finely powdered metallic aluminum, over a period of six to 23 years, the average for the group being 12 years. Heavy concentrations of alumium had been inhaled by these men over this long period of time, and the records disclosed that the health of these men was better than that of 3,000 workers in other sections of the plant. X-ray films of the chest disclosed no abnormalities attributable to aluminum. Consequently the investigators concluded 'that the inhalation of even large amounts of aluminum powder over many years had no harmful effect. It did not cause lung damage nor favor the development of tuberculosis or any other pulmonary condition.'

"Therefore, feeling that aluminum powder might act as a therapeutic agent in already established cases of silicosis, a clinic was set up at the Porcupine Gold Mines in Timmins, Ontario, where Drs. Crombie and Blaisdell conducted their treatment of human silicosis. Similar treatment was carried out at Washington, Pennsylvania, by Dr. J. W. G. Hannon. Both investigators concluded that,

"1. Inhalation of aluminum powder is harmless and gives no evidence of toxicity.

"2. Inhalation of aluminum powder results in improvement of the workers' morale, health and production capacity.

"3. Inhalation of aluminum powder would prevent the development of human silicosis.

"Because of the interest in silicosis, time was spent with Dr. Hannon in Washington, Pennsylvania, and after having seen the method of treatment in operation, investigating the men treated and verifying some of the claims made, the authors were satisfied sufficiently to place the treatment in operation at two different plants in East Chicago, Indiana, namely the Harbison Walker Refractories and the Continental Foundry & Machine Company. This is a report on the results of the investigation of aluminum therapy conducted at the Continental Foundry & Machine Company.

"The treatment is entirely on a voluntary basis on the part of the employee. The departmental heads and foremen were lectured on the subject and they in turn spoke to their men. Treatments were started in June, and as of November 1, 1944, only six men refused the treatment; one because of religious reasons, and the other five because they felt that they were in good health and needed no treatment. Otherwise, the cooperation of the men has been excellent to the extent that 276 men have been subjected to treatment, 75 having already completed.

"All of the men treated either are in contact with silica at present or

THE new light became visible like a dazzling meteor in the evening of the nineteenth century. It surrounded the morning of our own century with the rosy light of hope and promise. Like a glittering sun it shines resplendent on the working day of the twentieth century, revealing new fairways and fresh horizons in nearly every land in the world of science. **. . . In commemorating William Conrad Roentgen this year—the centennial of his birth, also the semi-centennial of his discovery of the x-ray—one is inspired anew by the above tribute spoken by Dr. Gosta Forssell, of Stockholm, Sweden, before the Fifth International Congress of Radiology, held in Chicago in 1937.**

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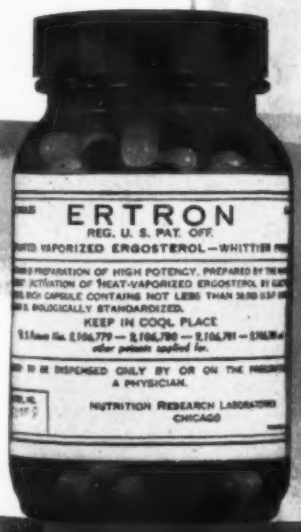

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have been in the past at this or some other plant. Those who are contacts at present are employed in the following departments: Molding, Core and Cleaning.

"A careful history was taken and a thorough examination performed on all men and an x-ray of the chest taken immediately before treatments, except in a few subjects who were x-rayed months before; however, no x-ray was older than one year. Upon completion of the treatment the men were re-x-rayed. The following classification of chest plates was used based upon interpretations made by Dr. Charles W. Rauschenbach, of Hammond:

From *Monthly Bulletin*, Indiana State Board of Health, 48:9, September, 1945.

L.N. (*Normal Lung*): Markings such as ordinarily seen in boys under 18 with no changes.

L.A.N. (*Average Normal Lung*): Hilum shadows increased. Peribronchial markings increased. No pathology.

L.A.N.+ (*Avg. Normal Lung Plus*): There may be fibrosis, calcifications, increased bronchial markings. No pathology.

L.A.N.++ (*Avg. Normal Lung Plus 2*): At the limits of normal. Heavy markings. Some calcifications.

P.P.S. (*Potential Primary Silicosis*): No nodulations. Hazy appearance. Not pathognomonic of silicosis.

P.S. (*Primary Silicosis*): Definite nodulation and hyaline formation, discrete and small.

S.S. (*Secondary Silicosis*): Same with large and small nodules.

T.S. (*Tertiary Silicosis*): Massive involvement—Silicotuberculosis.

"The above classification fits into our purpose better than any other classification.

"In treating the subjects they were classified in two groups: Prophylactics, consisting of the N and N+, and Therapeutics, consisting of N++, P.P.S., P.S., S.S. and T.S., the former receiving 30 treatments and the latter, 40. The N++ group was included in the Therapeutic class, not because they are considered silicotic, but because it was felt that this group would best demonstrate any possible change.

Table I—Number Subjected to Treatment 276
Number Completed Treatment 75

"The histories revealed the following complaints with the frequency in the order named: cough; dyspnea; loss of weight; weakness (fatigue); poor appetite; pain in chest; tightness in chest. Many individuals were noted to have extensive fibrosis and nodulation, doing their work regularly, without symptoms and showing little or no disability.

"The examination of the heart revealed findings in three of the T group and eight of the P group, such as tachycardia, arhythmia, murmurs, accentuated and diminished tones, and enlargement. In regard to the lungs, 18 T and 13 P revealed such findings as rales, wheeze, spasm, diminished or obliterated sounds, coarse or harsh sounds and emphysema.

"With the exception of excluding old tubercular subjects, leutics and asthmatics, all men exposed or previously exposed were chosen. Because men are transferred from one department to another, the following representation was obtained: Cleaning and Finishing; Mold; Core; Open Hearth; Construction; Repair and Maintenance; and Machine Shop. The period of contact varied from several years to 35 years.

"The aluminum powder is manufactured in a mill approved by McIntyre Research, Limited. The mill consists of an aluminum cylinder 12 x 12 inches, mounted on a ¾-inch hollow shaft. This shaft, inside the mill, has a large number of small perforations on either side of a short central core which prevents the inspired air from being drawn directly through the shaft without entering the cylinder. The shaft is connected by means of a perforated cam to a reducing gear operated by a ¼ h.p. electric motor, rotating the cylinder at approximately 72 rpm. The opposite end of the hollow shaft is connected to a 12 liter glass bottle serving as a settling chamber where the coarser particles of powder settle out.

"A charge of 25 pounds of chemically pure aluminum pellets (sheared from $\frac{3}{16}$-inch aluminum rod and measuring about $\frac{3}{16}$ in. length) is placed in the cylinder; a small amount of aluminum powder is also introduced with the pellets as a "primer." Before use, the mill is operated about one-half hour so that maximum efficiency is reached. In general, at an air flow rate of 10 liters per minute through the mill, about ⅔ milligrams of aluminum powder per liter of air are produced. This powder is black in color, having the appearance of soot and assays 20% metallic aluminum and 80% oxide.

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[1]Smith, L. W. and Livingston, A.E.—"Chlorophyll: An experimental study of its water-soluble derivatives in wound healing," *AMER. J. SURG.* New Series LXII: 358 (1943)

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A constituent of human bile, it is the fraction chiefly concerned with fat emulsification, promoting the digestion and absorption of ingested food fats and the utilization of the fat-soluble vitamins.

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about one-half hour, the 12 liter bottle is connected to the patient by a 2-inch rubber tube with a mouthpiece at the end. The mouthpiece has the shape of a T with a double Douglas valve at the ends of the top portion, consisting of metal and rubber discs held in place by a metal screw valve. The valve prevents re-breathing into the system. The nose is clamped lightly, and as the subject inspires, air enters the shaft through the perforations in the shaft. Here the air becomes charged with the powder and is drawn back into the shaft through the perforations on the other side of the center core. The powder-laden air enters the glass bottle, where the coarser particles settle out, and the finer particles enter the outlet tube at the top of the bottle to which the subject is connected.

"The men stand while breathing, consequently being able to breathe much deeper, and receive a better distribution of the powder throughout the dependent portions of the lungs. It is difficult to determine the exact amount of powder inhaled. A good portion of the powder remains in the mouth and upper respiratory passages. It is also possible that much of the powder reaching the smaller bronchi is excreted. To be effective the powder must reach the terminal bronchioles or alveoli and be retained for a considerable time in order to permit the coating action on the silica, whereby the solubility of the silica is lessened, thereby reducing its irritable action.

"Other than a dryness of the mouth the inhaled powder causes no discomfort. Some of this black powder, which is odorless and tasteless, is seen on the tongue, laryngeal and pharyngeal mucous membrane, where it remains for a short period. It is also seen in the sputum shortly following the treatment.

"The treatments are given by a registered nurse, under medical supervision, with careful attention being given to proper sterilization of parts used. The procedure used was to start the men with two minutes and increase one minute every day until five minutes are reached. Thereafter the prophylactics are given two treatments a week for a total of 30, and the therapeutics three treatments a week for a total of 40, each treatment for a maximum of eight minutes having been increased by one minute per treatment.

"In evaluating the changes in symptoms the men were clasified as follows:

"*Group 1:* Those with either definite findings on history or physical examination before treatment with improvement.

"*Group 2:* Those with either definite findings on history or physical examination before treatment with no improvement.

"*Group 3(a):* Those with no findings on history or physical examination stating they feel better as far as general health.

"*Group 3(b):* Those with no findings on history or physical examination stating there was no change.

Table II	*Totals*	*Per Cent*
Group 1—Definite improvement	23	30.66
Group 2—No improvement.	21	28
Group 3-a—Moderate improvement ..	19	25.33
Group 3-b—Stationary negative	12	16

"The improvement was manifested by less cough, easier breathing, less fatigue, improved appetite, etc.

"None of the subjects treated became worse. Whether the improvement of Group 3-a is psychological or whether there may have existed disability of which the subject was not aware is difficult to establish.

"Conclusions: (1) Inhalation of aluminum powder, while not a cure for silicosis, results in the amelioration of symptoms of silicosis and in an increased capacity for work in a significant high percentage of cases. (2) Inhalation of aluminum powder gives no evidence of toxicity. (3) There is early evidence that aluminum therapy will be of value as a prophylactic measure."

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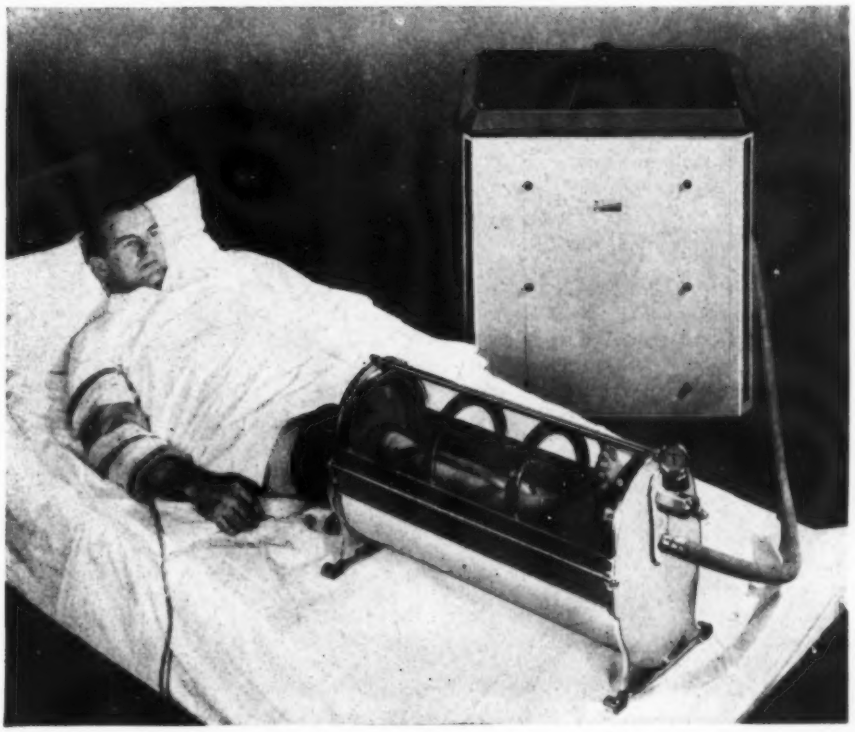

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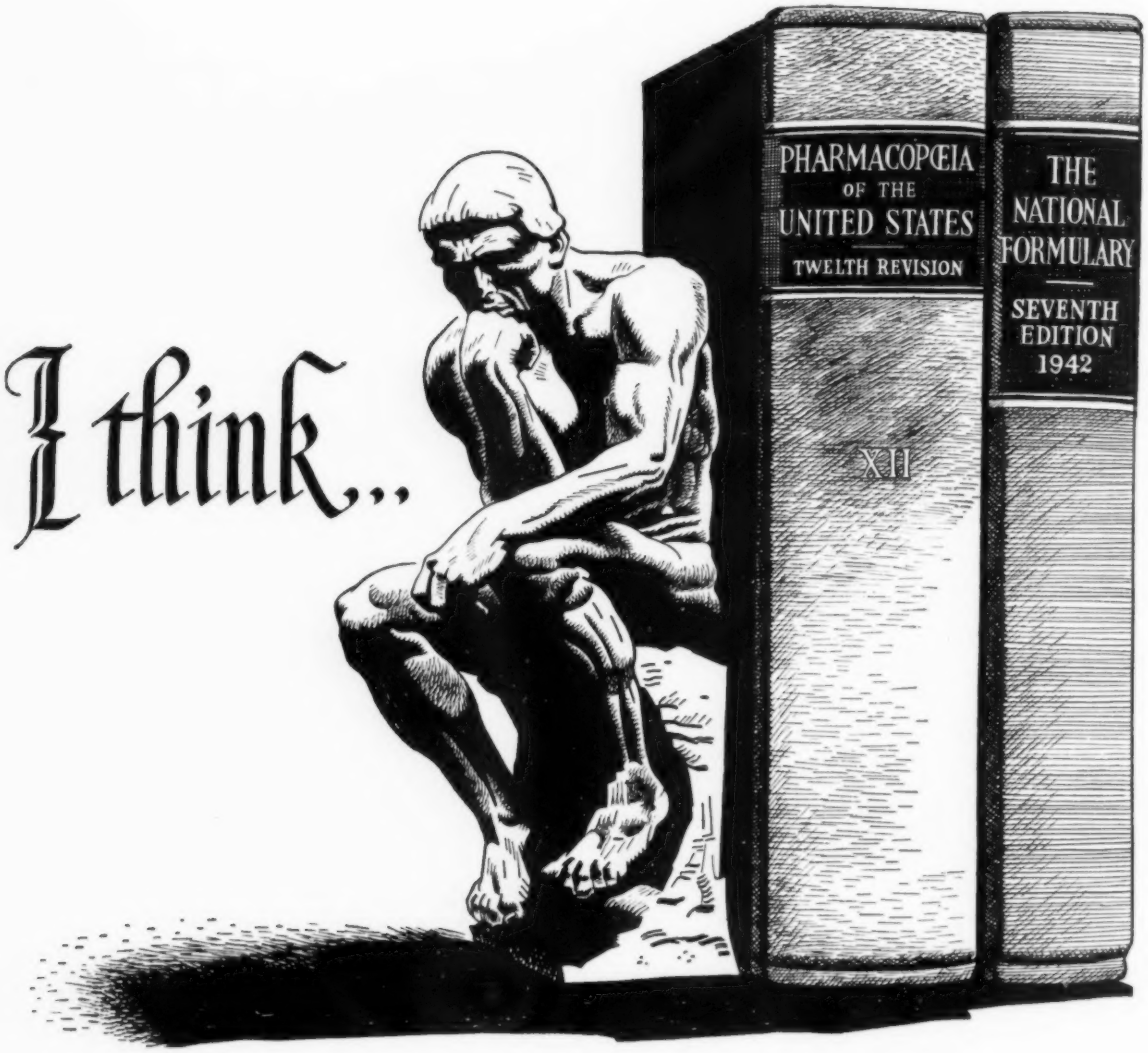

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The Journal of Industrial Health, Occupational Medicine and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

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The Relation of Hypersensitiveness to Poison Ivy and to the Pure Ingredients in Cashew Nut Shell Liquid and Related Substances

—A quantitative study based on patch tests—

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PATCH TEST studies carried out during the past two years[1] have shown a remarkable biologic relation between hypersensitiveness to poison ivy and to a variety of compounds of phenolic structure, both synthetic and nonsynthetic in origin. On the basis of chemical structure these substances may be classified conveniently as alkenyl and alkyl derivatives of catechol, resorcinol and phenol.[2] Compounds of this type bearing normal unsaturated side-chains, frequently of 15 carbons, are typical of the noxious ingredients found in the "poisonous" members of the Anacardiaceae family, of which the best known in this country is poison ivy and its congeners. The active ingredient in the poison ivy plant is a catechol derivative with a normal 15-carbon side-chain in the 3-position, possessing an average unsaturation equivalent to two double bonds.[3]

Interest in the Anacardiaceae has increased with the growing commercial importance of many products obtained from various members of this universally distributed family of trees, shrubs and vines. In addition, large numbers of our Armed Forces, particularly those in the Far East, are coming in contact with members of the Anacardiaceae, and the reports of disabling dermatitis from such sources are on the increase. It seems of value, therefore, to point out the chemical and biologic relation among the active ingredients found in the Anacardiaceae, with particular reference to persons already sensitive to the poison ivy plant.[2]

Cashew nut shell liquid, one of the products from this family of plants, has found important commercial usage. It is an oily material obtained from the shell (pericarp) of the nut Anacardium occidentale, the true cashew nut tree. This tree, originally native to Brazil, has been transplanted to India, and these two countries are the chief sources of supply of cashew nut shell liquid. The oily liquid is used as a raw material for the manufacture of certain resins and plastics which are incorporated in brake linings and insulating materials. The electrical properties of the latter are such that the material is of particular value in the insulation of the ignition system of airplane engines and of transformers which may be subjected to severe atmospheric conditions. However, the hazard of dermatitis from the raw oil, and in some cases even the finished resinous products derived from it, has been a problem of concern to handlers of these materials.

The commercial raw cashew nut shell liquid contains as its active ingredients cardol, anacardic acid and a decarboxylated derivative of anacardic acid called anacardol.[4] Cardol is a derivative of resorcinol with an unsaturated 15-carbon side-chain in the 5-position, whereas the other two compounds are derivatives of 2-carboxy phenol and phenol respectively, with a similar unsaturated side-chain in the 3-position (formulas 1-3, Fig. 1).[5] In a previous publication[2] we have discussed, in general, the biologic and chemical relations between hypersensitiveness to poison ivy and to the various components isolated from cashew nut shell liquid. From data obtained in a study of over 150 persons patch-tested with these substances, we have selected for consideration here quantitative observations made with 38 persons hypersensitive to poison ivy.

Patch tests were made in the usual manner and the results recorded according to criteria previously described.[1a] The dilutions were made in acetone as the solvent. The patch sites were examined after 48 hours and often after 96 hours as well. It should be noted that in all control subjects who showed negative patch tests with poison ivy leaves or extract or related substances,[6] the responses to cashew nut shell liquid and its components and related compounds were also negative. On the other hand, patients sensitive to poison ivy or related compounds showed an almost constant group reactivy to certain components of cashew nut shell liquid. The concentrations used for testing were

This study was made possible by a grant from the Irvington Varnish and Insulator Company, Irvington, New Jersey.

After the manuscript for this article had been prepared, there appeared in the June issue of this journal, INDUSTRIAL MEDICINE, 14, 500 (1945) an article by DR. LOUIS SCHWARTZ and collaborators dealing with the "Skin Hazards in the Manufacture and Use of Cashew Nut Shell Liquid—Formaldehyde Resins." Certain of the findings and conclusions made by DR. SCHWARTZ and his collaborators are not in agreement with ours. Rather than alter the manuscript of this article we have indicated the nature of our criticisms in an accompanying "Letter to the Editor" (see p. 852, this issue).

not primarily irritating to the skin, and the positive reactions were typically eczematous in nature. In addition to the ingredients of raw cashew nut shell liquid, we also tested their hydrogenated derivatives and a number of related compounds for the purpose of elucidating further the relation of chemical structure to group specific reactivity.

Several tables are introduced to show most of the data, and additional observations are included in the body of this article. Table 1 is designed to show the relation between positive reactions to the poison ivy plant and to the various pure components of cashew nut shell liquid and certain derivatives. This comparison has been made between ground poison ivy leaves (or extract) and various concentrations of these compounds ranging from 1.0 to 0.0001% in acetone. Where for a given case two patch test readings appear in the same column, the upper one refers to the reading at 48 and the lower to the reading at 96 hours. Table 2 arranges the components of cashew nut shell liquid and their derivatives in decreasing order of incidence of reaction. It also compares the intensity of reactions in various concentrations of compound with that of the poison ivy material in the same group of persons, thus providing a rough basis for determining the concentration of substance equivalent in response to the active ingredient in the specimen of poison ivy used. It must be stressed that comparisons have been made on the same group of patients, and that any apparent discrepancy in such comparisons can be attributed to variations in intensity of response in different groups of persons. Table 3 compares the intensity of reactions to poison ivy leaf (or extract), tetrahydrocardol, 3-pentadecyl phenol (tetrahydroanacardol), and 3-pentadecyl catechol in various concentrations, and affords a basis for comparing compounds with saturated side-chains of the same carbon length in phenol, resorcinol and catechol derivatives respectively (formulas 5, 6 and 7, Fig. 1).

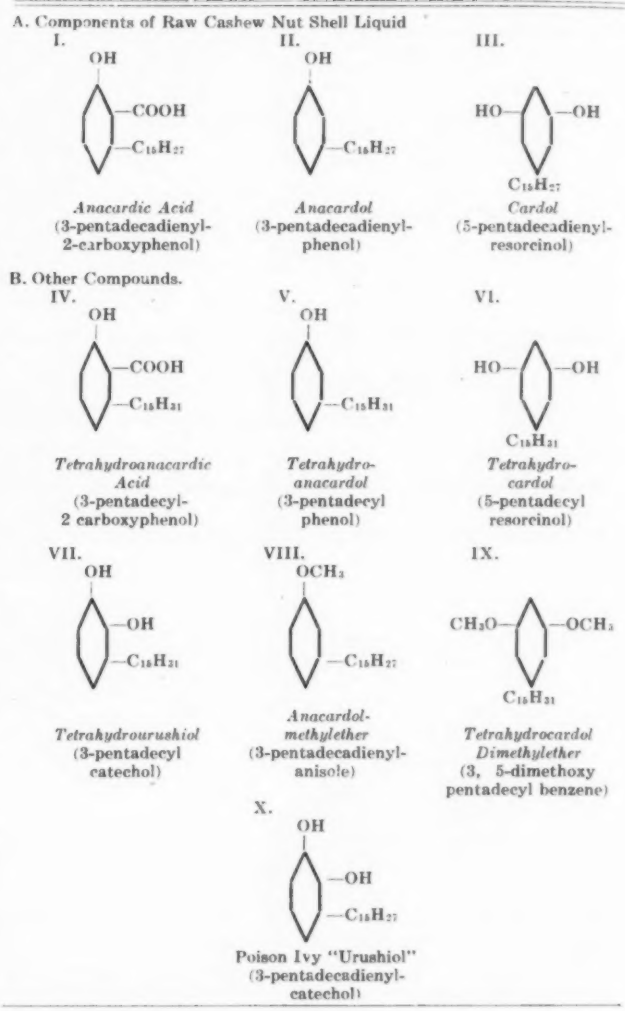

Fig. 1.

Results of Quantitative Patch Tests in Persons Sensitive to Poison Ivy

A. INGREDIENTS IN RAW CASHEW NUT SHELL LIQUID (TABLE 1 AND 2):

Cardol elicited the most pronounced reactions, by far, of all the components of raw cashew nut shell liquid. Except for one instance out of four (case 20, Table 1) the responses to a 1% concentration were so intense that it was deemed wise to limit the studies to concentrations of 0.2% and less. Table 1 shows that, even at 0.2% concentration, the intensity of response to cardol averaged about 3 plus. This is likewise shown in Table 2 which is a compilation of Table 1. Cardol, as well as the other substances, showed a variable degree of cross-reactivity in different subjects; for example, in two instances the reactions became positive only at 72 to 96 hours. Case 20 merits special notice since it concerned a weak group-reactor showing a negative response to 0.2% but a positive reaction to a 1% concentration (1-2 plus). It may be noted also that of 10 subjects tested with a dilution of 0.0001% cardol, three gave definite positive responses to this very low concentration.* Table 2 shows that cardol gave 100% positive responses in persons sensitive to poison ivy, when calculated on the basis of the highest concentration used. (See footnote to Table 2.) Cardol was therefore the most potent group reactor from the points of view of incidence and intensity of response. Table 2 also gives comparative data on the intensity of reactions of cardol and the poison ivy material, and it can be seen that 0.01% cardol gave reactions equivalent to the poison ivy materials in intensity, whereas in higher concentrations cardol elicited more intense responses than the poison ivy materials.**

Anacardic acid elicited much weaker responses than cardol in comparable dilutions. The incidence of positive reactions was 90% (Table 2), which is not vastly different from that of cardol (100%). However, the difference between these two substances are shown clearly when intensities of reaction are compared. Reference to Table 2 shows that at all dilutions anacardic acid gave much weaker responses than cardol; in addition, the intensity of reaction to anacardiac acid was equivalent to that of the poison ivy materials at a concentration between 1% and 0.2%, whereas the equivalence point for cardol was 0.01%. Finally, it may be noted in Table 1 that of the 10 subjects tested with a concentration of 0.0001% anacardic acid, two showed definite positive reactions.

Anacardol gave essentially the same responses as anacardic acid in comparable dilutions (See Table 2). Slight differences, sometimes greater and sometimes less, were observed in a few instances, but these may be regarded as probably insignificant. The loss of a carboxyl group from anacardic acid to form anacardol was therefore not attended by any appreciable change in the group reactivity.

*Since approximately 1 drop (0.05 ml.) of the 0.0001% acetone solution was used in the patch test, there was about 0.05 micrograms of cardol in contact with the skin.

**It should not be inferred that cardol in 0.01% concentration is equivalent in potency to fresh poison ivy leaves or extract, since the poison ivy specimens used in this study were approximately two years old.

TABLE 1.

Case No.	Poison Ivy Leaves or Extr.*	Cardol %					Anacardic Acid %					Anacardol %					Tetrahydrocardol %					Tetrahydroanacardic Acid					Anacardol Methyl Ether %				
		1.0	0.2	0.01	0.001	0.0001	1.0	0.2	0.01	0.001	0.0001	1.0	0.2	0.01	0.001	0.0001	1.0	0.2	0.01	0.001	0.0001	1.0	0.2	0.01	0.001	0.0001	1.0	0.2	0.01	0.001	0.0001	
1	II(+) P		IIII(+) 4-5	III	0	0		III	0	0	0	II(I)		0	0	0		II(+)					II					I(+)	0	0	0	
2	II(+) P	IIII(+) 4-5					III										III					II									Patches removed in 12 hrs. Itching
3	I(+) E	IIII(+) 4-5		II(+)	+	0	III		II	-	0	II(+)					III					I(+)					0	0				
4			III					II					I(+)					II(+)					-									Patient observed in 2 attacks of clinical poison ivy dermatitis
5	II(+) P	III		II(+)			II(+)		+			II(+)					II(+)					I(+)									
6	III P		III(+)		III	II		II(+)		II	I(+)		III		II(+)	I(+)		+					-					II		0	0	Poison ivy clinically
7	II P		II(+)	I(+)	0	0		+	0	0	0		I(+)					-					-					0				
8	II(+) P III E		III(+)					II					II(+)					II(+)					-					I(+)				All reactions delayed to 96 hrs. except poison ivy. Cardol site visible 2 mo. later
9	I(+) P II(+) E			II	0	0			0	0	0			I(+)	0	0												0	0	0	
10	III P			IIII	III	II(+)			III(+)	III	II(+)																				Cardol strongest reactor
11	III E			II IIII				0 II(+)					0 I(+)					0 II(+)	0 +	0 0	0 0		0				0 I(+)				
12	I(+) P		I(+)					0					0					0					0					0				
13	IIII E		IIII					II(+)					III(+)					III					I(+)					I(+)				
14	III E		II(+)					+					I(+)					+					0					0				
15	III E		II(+)	0 II	0	0		I(+)	0	0	0		I(+)					II					0					0				
16	III E			II(+)	I(+)	0		II	0	0	0																					Clinical poison ivy dermatitis
17	III E		0 III					0 +					0 II					0 I(+)					0					0				
18	III P			III(+)	III	II			III	I(+)	0			III	II	+													0	0	0	
19	I(+) P		II(+) III	II(+) III	+ +	0 0		I(+) I(+)	I(+) I(+)	+ +	0 0					0 0		+ II(+)	+ +	0 0	0 0		0 +	0 0	0 0	0 0			0 0	0 0	0 0	
20	II P III(+) P	I(+)	0 0	0 0			0 +	0 0	0 0					0 0														0 0				
21	III(+) P		0 II(+)															0	0	0	0											
22	III E			0 I(+)					0 +				0 +															0 0				

*P = Powdered Leaf E = Extract

B. COMPOUNDS RELATED TO THE INGREDIENTS IN CASHEW NUT SHELL LIQUID:

Tetrahydrocardol, the saturated analogue of cardol, was tested in 32 subjects (Tables 1 and 3). The incidence of group reactions (81%) was slightly less than anacardic acid (90%) but far less than cardol (100%) (Table 2) as computed in the same group of subjects. The intensity of response was about the same as that of anacardic acid and anacardol when direct comparisons were made, and practically the same equivalence point was found when compared with the poison ivy materials (between 1% and 0.2%). In seven additional subjects (data not shown in the Tables) comparative tests carried out with the pure tetrahydrocardol obtained from the natural source and with synthetic tetrahydrocardol showed that these substances elicited practically identical effects on the skin.

Tetrahydroanacardic acid, the saturated analogue of anacardic acid, showed a pronounced diminution in the incidence of group reactions (40%) as compared with anacardic acid (90%) (Table 2). The intensity of response was also much weaker than that of anacardic acid and the equivalence point, determined in relation to the poison ivy materials, was found to be above a 1% concentration.

Tetrahydronanacardol (3-pentadecyl phenol), the saturated analogue of anacardol, was tested in 33 cases, of which the data for seven are recorded in Table 3.*** This table shows the comparative effects on the skin of tetrahydroanacardol, tetrahydrocardol, and tetrahydrourushiol (3-pentadecyl catechol), these substances being featured by a similar saturated side-chain in the position meta to at least one hydroxyl group.

It can be seen from the table that tetrahydroanacardol produced reactions that were less frequent and intense than tetrahydrocardol. This difference is shown clearly in five cases (cases 23, 24, 27, 34, and 35) in which 0.2% tetrahydrocardol elicited responses that were more intense than tetrahydroanacardol in 1% concentration. Among the 33 persons tested with tetrahydroanacardol in 1% concentration, 15 gave completely negative responses, three, a 1 plus reaction; 10, a 1-2 plus response; and five, reactions ranging from 2 to 3 plus. Among these cases were three in which comparative studies could be carried out with anacardol (3-pentadecadienyl phenol). In all three instances the unsaturated phenol anacardol gave far more intense reactions than its saturated analogue.

Anacardol methyl ether (3-pentadecadienylanisole) (formula 8, Fig. 1) showed positive responses in only 31% of 16 cases positive to poison ivy (Table 2). When the intensity of response is compared with that of the corresponding free phenol (anacardol), it can be seen (Tables 1 and 2) that the methyl ether gave much weaker reactions almost without exception.

Although sufficient observations were not made to permit the determination of the equivalent value of anacardol methyl ether with the poison ivy materials, it is of interest to look at several of the cases in Table 1 from this point of view. The results with case 3

***Of the 33 patients patch tested with tetrahydroanacardol, only seven were simultaneously patch tested with tetrahydrocardol and tetrahydrourushiol.

TABLE 2.

Compound	No. of Patients	No. of Patches	% of Patients* Giving Positive Responses	0.1% Conc. of Compound				0.2% Conc. of Compound				0.01% Conc. of Compound			
				No. of Patches		Average Intensity of Positives	Av. Int. of Resp. to Poison Ivy in Same Group	No. of Patches		Average Intensity of Positives	Av. Int. of Resp. to Poison Ivy in Same Group	No. of Patches		Average Intensity of Positives	Av. Int. of Resp. to Poison Ivy in Same Group
				Tested	Positive			Tested	Positive			Tested	Positive		
Cardol	22	30	100%	4	4	III(+)	II(+)	14	13	III	II(+)	12	11	II(+)	II(+)
Anacardic Acid	21	29	90%	4	4	II(+)	II	14	12	II	III	11	6	II	II(+)
Anacardol	17	18	88%	3	3	II(+)	II	10	9	II	III	5	3	II	II(+)
Tetrahydro-Cardol	16	19	81%	3	3	II(+)	II	13	10	II	III	3	2	I	II
Tetrahydro-Anacardic Acid	15	16	40%	3	3	I(+)	II	12	3	I(+)	II(+)	1	0	0	I(+)
Anacardol Methyl Ether	16	18	31%	1	0	0	I(+)	11	5	I(+)	III	6	0	0	II(+)

*These percentages were calculated on the basis of the highest concentration used for each particular case. For example, when several concentration levels were tested on the same patient, the response to the highest concentration was used in calculating the incidence of positive reactions.

show that a weak reactor to poison ivy extract (1 to 2 plus) gave a negative response to anacardol methyl ether even in 1% concentration, whereas stronger reactors to poison ivy extract (3 to 4 plus), such as cases 8, 11, and 13, gave a positive reaction to the methyl ether in 0.2% concentration.

The methylation of tetrahydrocardol to produce 3,5-dimethoxypentadecyl benzene (formula 9, Fig. 1) resulted in a considerable decrease in cross-reactivity. Of 26 persons sensitive to poison ivy (data not included in the tables), 24 gave completely negative responses to a 1.0% concentration of 3,5-dimethoxy pentadecyl benzene, whereas only two persons showed a positive reaction (average 2 plus).

It seems possible that the incidence of positive responses to the methyl ethers of tetrahydroanacardol and tetrahydrocardol might be due to contamination of these ethers with small amounts of the corresponding free phenols. The free phenols might arise as the result of slow hydrolysis or oxidative ether splitting during long standing in the presence of air prior to use. This view is in line with our experience that the freshly prepared ether appeared to give a lower incidence of positive response. It should be emphasized, however, that no free phenolic hydroxyl groups could be chemically detected in the specimen of tetrahydrocardol dimethyl ether even after long standing. It is, of course, also possible that the skin possesses the ability to demethylate slowly such methyl ethers and thereby give rise to a positive response. In this connection it is of interest that 3,5-dimethoxy pentadecyl benzene is very difficult to demethylate chemically.

Discussion

OF THE components isolated from raw cashew nut shell liquid, cardol which has two hydroxyl groups meta to each other and to the unsaturated side-chain (formula 1), was the most intense reactor on persons sensitive to poison ivy. On the other hand, the weaker reacting substances in cashew nut shell liquid, anacardic acid and anacardol, have a single hydroxyl group in the position meta to a similar unsaturated side-chain (formulas 2 and 3). The presence of a carboxyl group situated ortho to the unsaturated side-chain and to the hydroxyl group, as in anacardic acid, had no appreciable effect on the cross-reactions shown by this substance as compared with the decarboxylated anacardol.

Hydrogenation of cardol, anacardic acid and anacardol to produce the fully saturated analogues, tetrahydrocardol, tetrahydroanacardic acid and tetrahydroanacardol (3 pentadecyl phenol) respectively, resulted in a considerable decrease in the ability to cross-react in persons sensitive to the poison ivy plant.

Methylation of anacardol to give 3-pentadecadienyl anisole, caused a pronounced decrease in the frequency and intensity of group reactions. This observation was also confirmed in the dimethylation of tetrahydrocardol to produce 3,5-dimethoxy pentadecyl benzene. Our studies showed definitely that blocking the hydroxyl groups by methylation has a more pronounced effect in diminishing the cross-reactivity than saturating the side-chain.

It may be noted that the fully saturated resorcinol derivative, tetrahydrocardol, elicited responses that were about as frequent and intense as the unsaturated monophenols, anacardic acid and anacardol. In a small number of persons sensitive to poison ivy it was found that the reactions given by pure tetrahydrocardol isolated from the natural source were essentially the same as those elicited by the pure synthetic tetrahydrocardol.

We have observed[6] that persons sensitive to poison ivy showed constant group specific reactions to 3-pentadecyl catechol. Indeed, this saturated analogue of the active ingredient in poison ivy may be used, in suitable concentration, as a replacement for the poison ivy materials in testing for hypersensitiveness to the poison ivy plant. It follows, then, that the group reactivity displayed by the ingredients in cashew nut shell liquid in persons previously sensitive to poison ivy may also be extended to include 3-pentadecyl catechol. Thus, among 48 persons tested with 3-pentadecyl catechol and one or more ingredients of cashew nut shell liquid, 27 were negative to both series of substances, whereas 21 showed positive reactions to both. The data in Table 3 also illustrate a similar relation between 3-pentadecyl catechol and tetrahydrocardol. Actually, in one phase of our studies (to be published later) we used 3-pentadecyl catechol concurrently with various commercial products of cashew nut shell liquid as a guide to poison ivy hypersensitiveness because at this time the powdered poison ivy leaves seemed to have lost its original potency.

Of the four saturated phenolic substances discussed in this paper (Tables 1 and 3), 3-pentadecyl catechol proved to be by far, the strongest cross-reactor in persons sensitive to poison ivy. The next in order of group

reactivity was tetrahydrocardol, and the weakest were tetrahydroanacardic acid and tetrahydroanacardol. The relation of chemical structure to cross-reactivity is shown clearly in an analysis of the results obtained with these substances. In persons sensitive to the poison ivy plant it is not surprising that, among these saturated phenolic substances, 3-pentadecyl catechol gave the most frequent and intense cross reactions since it is the saturated analogue of the active ingredient in the poison ivy plant. It has been pointed out that the active ingredients in the Anacardiaceae all have a phenolic structure with a long unsaturated side-chain in the position meta to at least one hydroxyl group.[2] Our observations show that this is the fundamental structural requirement for group reactions in persons sensitive to poison ivy. We may now examine this principle in relation to the phenolic substances having similar *saturated* side-chains. It will be seen that the weakest cross-reactions were elicited by compounds having a saturated side-chain in the position meta to a single hydroxyl group, as in tetrahydroanacardol. The interposition of a carboxyl group between the saturated side-chain and the hydroxyl group, as in tetrahydroanacardic acid, had no appreciable effect on cross-reactivity, and in this respect paralleled the similar relation observed in the case of the corresponding unsaturated substances. On the other hand, the introduction of a second hydroxyl group meta to both the saturated side-chain and the first hydroxyl group, as in tetrahydrocardol, enhanced the group-reactivity. The most intense cross-reactions were elicited by the interposition of a second hydroxyl group ortho to both the saturated side-chain and the first hydroxyl group, as in 3-pentadecyl catechol. These results therefore paralleled the relations shown by the corresponding compounds having an unsaturated side-chain.

Finally, brief mention may be made of the principle of equivalence as applied to the patch test. When the intensity of response produced by cardol was compared with that shown by the poison ivy materials in the same patients, it was found that a concentration of 0.01% cardol was about equivalent to the poison ivy materials used, whereas a concentration between 1.0% and 0.2% was required in the case of anacardic acid, anacardol and tetrahydrocardol. These data permit a rough estimation of the relative potencies of these substances. Thus, it may be said that cardol is between 20-fold and 100-fold more active than the latter three substances. This is apparently the first time that an

TABLE 3.

Case No.	Poison Ivy Leaves or Extr.*	Tetrahydrocardol % (Acetone) 1.0	0.2	0.01	0.001	0.0001	Tetrahydrocardol 1% (Acetone)*	Tetrahydrourushiol** % (Acetone) 1.0	0.1	0.01	0.001	0.0001	
23	II		II(+)	I +)	+	0	II		III(+)	II	II	+ −	Atopic dermatitis. Previous poison ivy derm.
24	III		II(+) III(+)	+ II	0 + −	0 0	II(+)	IIII(+)	IIII	III	I(+)	I(+)	Reactions to 3-pentadecyl catechol delayed to 60 hrs. Came in with fading poison ivy.
25	II(+) III		0	0	0	0		III(+)					Previous poison ivy derm.
26	III I(+)		I(+) II(+)	+ I(+)	0 I(+)	0 0							Acute poison ivy dermatitis. Legs.
27	III E IIII E		II II(+)	0 +	0 0	0 0	+ II	III IIII	+ III	+ − III	0 0	0 0	Previous rhus dermatitis.
28	+ II		+ − 0	0 0	0 0	0 0		+ III(+)	0 II(+)	0 II(+)	0 I(+)	0 0	Previous rhus dermatitis.
29	III I(+)		III III(+)	II(+) III	II III	+ I(+)							Rhus dermatitis at time of testing.
30	0 +		0 0	0 0	0 0	0 0			0 II				Previous rhus dermatitis.
31	II(+) II		I(+) III	+ II	0 + −	0 0			II(+) III				Rhus dermatitis at time of testing.
32	I(+) +		+ − II	+ − 0	0 0	0 0			+				Previous rhus dermatitis.
33	II(+) II		+ II	+ − +	0 0	0 0			+ III				Probably poison ivy at time of testing.
34	0 +	0 III	0 II(+)	0 0	0 0	0 0	0		0 III				Previous rhus dermatitis.
35		II(+) III(+)	+ III	0 0	0 0	0 0	0	0 III					No history of rhus dermatitis.
36		0 0	0 0	0 0	0 0	0 0	0	0 II(+)	0 I(+)				Chinese boy—no history of rhus dermatitis.
37		0 0	0 0	0 0	0 0	0 0	0	+ III					No history of rhus derm. Boy 15 years old.
38			0 II						0 I(+)				Previous history of rhus dermatitis.

*Tested with poison ivy leaves except where indicated with an "E" meaning extract.

**A comparison of the incidence of positive reactions in this particular group of patients shows that the strongest reactor was tetrahydrourushiol (100 per cent of 16 cases); the next strongest was tetrahydrocardol (69 per cent of 16 cases); and the weakest was tetrahydroanacardol (43 per cent of 7 cases). While a statistical statement, based on comparable concentrations, cannot be made regarding the comparative intensity of reactions, these data nevertheless show clearly that the intensity of response parallels the incidence of reaction.

attempt has been made in the case of contact dermatitis to compare equivalence points, although this has been done here with an unstandardized material, such as the poison ivy leaf and extract. It will be interesting to apply this principle using standardized substances on the one hand and unknowns on the other hand.

Summary and Conclusions

THERE is a remarkable biologic relation between hypersensitiveness to poison ivy and to a variety of phenolic structures.

2. Typical of the noxious ingredients found in the "poisonous" members of the Anacardiaceae, to which the poison ivy plant and the cashew nut tree belong, are catechol, resorcinol and phenol derivatives with a long unsaturated side-chain in the position *meta* to at least one hydroxyl group.

3. In persons sensitive to poison ivy the fundamental structural requirement for group reactivity is the presence of a long unsaturated side-chain in the position meta to an hydroxyl group attached to a benzene ring. The presence of an additional hydroxyl group in various positions on this basic structure exerts an important influence on cross-reactivity. This is also true of certain modifications in chemical structure, such as hydrogenation of the side-chain and methylation of hydroxyl groups.

4. Raw cashew nut shell liquid contains as its active ingredients cardol, anacardic acid and anacardol. Cardol is a derivative of resorcinol in which the two hydroxyl groups are meta to each other and to the unsaturated side-chain (average of two double bonds). This is the most potent group-reactor in cashew nut shell liquid. The weaker reacting substances, anacardic acid and anacardol, have a single hydroxyl group in the position meta to a similar unsaturated side-chain. The presence of a carboxyl group situated ortho to both the unsaturated side-chain and to the hydroxyl group, as in anacardic acid, had no appreciable effect on the group reactions shown by this substance as compared with the decarboxylated anacardol.

5. Hydrogenation of the unsaturated side-chains in cardol, anacardic acid and anacardol produces saturated analogues which show a pronounced decrease in the ability to cross-react.

6. Methylation of anacardol and tetrahydrocardol resulted in compounds exhibiting considerable decrease in the frequency and intensity of group reactions.

7. Methylation seems to have a more pronounced effect in diminishing the cross reactions than saturating the side-chain. Pure tetrahydrocardol isolated from the natural source gave essentially the same reactions as those shown by synthetic tetrahydrocardol.

8. Of the saturated phenolic substances studied, the potency of cross reactions in diminishing order were: 3 pentadecyl catechol, tetrahydrocardol, tetrahydroanacardic acid and tetrahydroanacardol. This behavior corresponds essentially to the rules which hold in the case of the unsaturated analogues.

9. A preliminary attempt has been made to study the principle of equivalence as applied to patch testing.

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Physical Medicine in Industrial Injuries

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A TREMENDOUS impetus was given to physical medicine during and immediately after the first world war. The importance of physical medicine in reducing time loss from service and in preventing many permanent disabilities was fully demonstrated. However, the physicians in charge of army hospital departments of physical medicine were given no specialized training to prepare them for their responsibilities, and a course of only 12 weeks' training was given for technicians, which although intensive was inadequate. But in spite of these handicaps much was accomplished. And in the interval between the two world wars progress in physical medicine has been slow, but steady and vigorous. Let us briefly review some of the more significant advances.

A Council on Physical Medicine was established by the American Medical Association in 1925. This Council, composed of physiologists, physicists, and clinicians, has exerted great influence in the development of physical medicine along scientific lines.

Today an increasing number of medical schools are giving organized courses in physical medicine for medical students as a requirement for graduation. A few medical schools have placed the department of physical medicine under the chairmanship of a full professor. Thus these departments have equivalent rank with other medical specialties. A few medical schools are offering one-year courses of study leading to advanced degrees in physical medicine. Fellowships are now available for qualified students, the purpose of which is to encourage younger promising physicians to study physical medicine and engage in fundamental research which is so essential to the progress of any developing science. Excellent one-year courses for technicians, now called physiotherapists, have been established in many cities. At present there are 31 such schools that have the approval of the Council on Medical Education and Hospitals of the American Medical Association. Furthermore, grants have been made available recently for scholarships to selected physiotherapists with the proper background and who are desirous of becoming instructors in this work.

A national registry for technicians has been established. Graduation from an accredited physical therapy school and a comprehensive examination are requirements for admission. While membership is not compulsory, the term "registered technician" is an asset when seeking employment, for it indicates the attainment of a certain degree of proficiency.

And now in another world war physical medicine is again playing an important role. The nature of today's war injuries, though more severe and numerous, is quite similar to that of industrial accidents. Therefore, since physical medicine has been found to be of value in war injuries, its value should be predictable

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in industrial injuries. Based on actual experience in the industrial accident field it is my opinion that physical medicine can be just as effective in decreasing time loss and in reducing the severity of permanent partial disability in the industrial field.

For example, physical medicine should prove of great value in the treatment of fractures. In "An Outline of the Treatment of Fractures" by the American College of Surgeons, the section on the healing of fractures gives many reasons for the use of physical medicine. In this outline it states: "Within a few hours of the fracture, fibroblasts appear in the fibrin clot and begin the formation of granulation tissue. The organization of granulation tissue proceeds in the fibrin mesh throughout the affected soft parts, and becomes organized tissue within a week. The effectiveness and rapidity of growth of tissue are dependent upon efficient circulation in the parts from which the cells are derived and are retarded by excessive fluid exudate at the site of fracture. Therefore, every effort must be made from the beginning to help the efficiency of the circulation." The circulation can be increased by the use of heat. The method of choice is the use of high frequency energy, preferably applied by the induction method. Although Blair[1] states heat can cause bony atrophy and that massage is not indicated before complete bony union has taken place, Kellogg Speed,[2] on the other hand, has shown that heat contributes to the production of a firmer union. In comparison with his control experiment, he states, "heat produced less bulky callous, less fibrous and cartilaginous callus but more mature bony callus." Freeman, Merriman and Osborne[3] studied the effect of diathermy on the excretion of urinary calcium and inorganic phosphorous in five healthy male adults. The subjects were placed on a constant diet for seven days. Then for the following seven days the thigh of each subject was heated by inductothermy for one hour daily at the subject's maximum tolerance. In spite of this maximal test there was no significant alteration in urinary calcium or inorganic phosphorous. Schmitt has[4] presented clinical evidence that heat produced by induction does not cause bone atrophy. His patients were given intensive inductothermy treatment. One patient (Figs. 1 and 2) with delayed union of nine months standing was given 82 two-hour treatments in 69 days. Thus it seems unlikely that bone atrophy is caused by heat produced in this manner. Unfortunately, heat has been applied too often without taking into consideration the pathology to be treated. Heat can be applied so as to produce an active hyperemia or to such a point that passive congestion results. Not only is dosage important but frequency of application must be given consideration in a prescription. For prolonged and frequent applications of short wave diathermy the induction field is the method of choice because of its physical adaptability to secure the desired distribution of power input, its applicability to all anatomic parts, and its established heating characteristics.[5]

Functional disabilities are frequently caused from fibrosis in the soft parts due to organization of the exudates produced at the time of fracture and intensified by prolonged or intensive immobilization of joints and muscles. These disabilities can be minimized by employing within the first 10 days physical measures which will provide for the removal of exudates and permit as much active exercise as is possible without interfering with the immobilization of the bone fragments. Heat, massage, and exercise are important procedures in the care of fractures. Their therapeutic value, however, is dependent on the skill with which

Fig. 1. Delayed union of tibia and fibula. Nine months' duration

Fig. 2. Complete union following 10 weeks of diathermy treatment

(Schmitt, M. G.: Optimal Dosage in Short Wave Diathermy. Arch. Phys. Therapy., 21: 716:1940)

they are prescribed and administered. Superficial heating of the tissues can be secured by using a generator of thermogenic radiation (luminous or non-luminous), or by means of a whirlpool bath. Contrast baths may also be used effectively where poor vasomotor tone is present. The treatment of adaptive muscle shortening following a long period of immobilization can be further augmented by applying the brace illustrated in Fig. 3.

Every surgeon should know the elementary principles of massage. As long as there is danger of displacement of fragments he should personally administer massage and early motion. The dominant effects of massage are on the nervous and peripheral vascular systems. Storms[6] writes in an article, "Diagnostic and Therapeutic Massage," as follows: "But I cannot say too strongly that the specialist in physical medicine who cannot massage his own patient if the occasion or the patient demands, who is missing the satisfaction of getting under his own expert hands the condition that requires treatment, who cannot criticize or train his own technicians, is depriving himself of a very large part of his function."

The importance of a specific program of physiologic activity is becoming realized more and more by those responsible for the management of surgical patients. The institution of specific programs of active exercise soon after operation has been found extremely useful in preventing postoperative complications and in hastening postoperative recovery. With some one part immobilized, adjacent parts should be exercised. Therapeutic exercise is used to improve tonus of skeletal muscles and to counteract muscle weakness and muscle atrophy. Watson-Jones[7] emphasizes this point in his recent book "Fractures and Other Bone and Joint Injuries."

After the initial hemorrhage has been treated and support given to the lacerated structures, the treat-

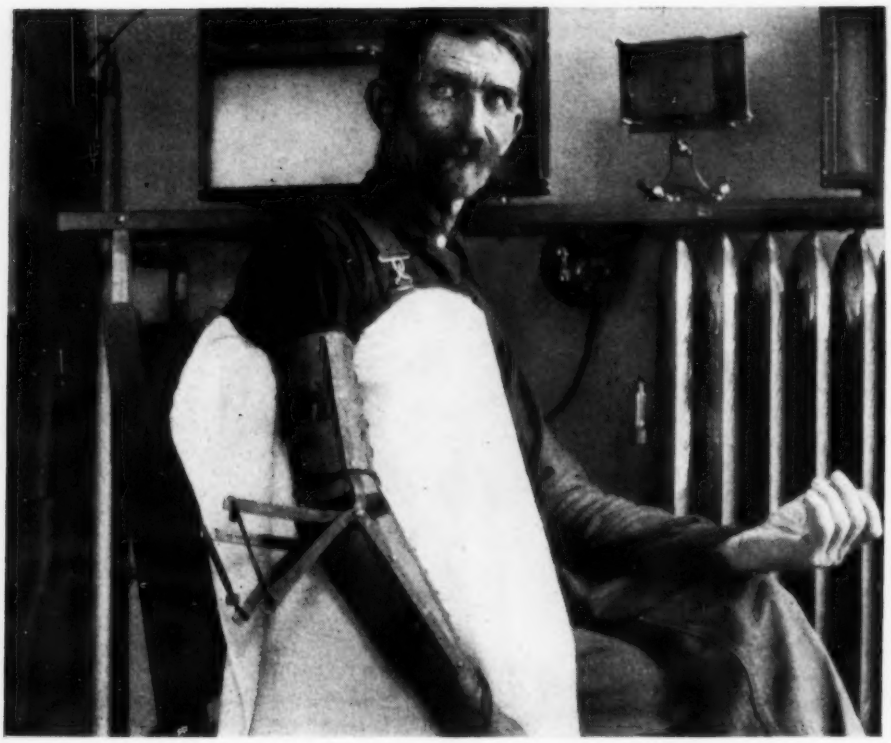

Fig. 3.
Author's brace for treatment of adaptive muscle shortening. Worn continuously except when given physical therapy treatment

Fig. 4
Simple walking device to prepare amputation stump for an artificial leg and to assist in overcoming muscle contraction

ment of strains, sprains, and dislocations can be materially aided by induction heating, giving long sessions of low intensity. The chief object of treatment is to assist in the removal and resolution of the vascular and lymphatic exudates which form as the result of trauma to the small arterioles and lymph channels. In many instances, in addition to the judicious employment of heat, an appropriate type of stimulating current applied to the muscles controlling the joint should aid this process. Bristow[8] advocated this during World War I and Smart [9] more recently has re-emphasized its value. By this means it is possible to give a physiologic type of massage not possible to produce by hand and which very closely simulates nature's own method of massage. Early treatment is essential. Depending upon the severity of the lesion that a joint sustains, any or all of its various structures may be damaged to a greater or lesser degree; but in every instance the muscles activating the joint always suffer. Hilton[10] has shown that in joint injuries, there is not only an atrophy from disuse but atrophy from a nutritional reflex. According to King and Holmes[11] this atrophy can take place within 48 hours when the joint injury is severe. Since joint function is dependent on muscular tone, electrical stimulation of the muscle should be employed early, to combat both forms of atrophy.

Physical medicine has a very definite place in the treatment of peripheral nerve lesions. The value of muscle re-education is fully appreciated. An outstanding book dealing with this work is "The Action of Muscles," by Colin McKenzie.[12] Massage, too, has been assigned a definite role, although from the work of Weddell, Feinstein and Pattle[13] it appears we might have to change its technic of application. The use of heat in the treatment of nerve lesions has not had such universal acceptance because of the sensory changes so likely to be present. However, in 1942, Bauwens[14] states "Provided the circulation in a paralyzed limb is capable of being accelerated, a rise in temperature and efforts to keep this near to the normal constantly are indicated, in order to promote repair, facilitate movement and increase excitability. This is best achieved by warming the limb in the high frequency field provided by coil electrodes. It is not enough to warm merely the affected cold part of a limb, as much as possible of the portion above the level should be treated so as to enhance the circulation generally." He further states treatment should be given twice daily and every effort made to prevent heat loss between treatments.

The value of stimulating the denervated muscle by electrical currents was first demonstrated and reported by Reid[15] in 1841. No critical evaluation of the experimental work which had accumulated since 1844 was undertaken until 1942. It was then that Osborne and Grodins[16] showed that certain general observations could be made. In general, when daily treatment was given, when the periods of stimulation were relatively long, and when the current strength was sufficient to cause a vigorous muscle contraction, the results were favorable. Without exception those who employed weak stimuli or short single periods of stimulation reported unfavorable results. The type of stimulating current used should conform to the electrophysiology of the muscles to be stimulated. Osborne, Grodins, Mittleman, Milne and Ivy[17] made an investigation on the basis of experimental studies to outline the current requirements for electrodiagnosis and electrotherapeutics and to establish the best methods for the application of such currents. From the physiological data obtained a muscle stimulating generator has been designed and is now in the process of manufacture. This generator will permit not only variation of modulation but also permits variation of the carrier frequency so that one can select the optimal frequency to produce the maximal muscle tension with the least current intensity. This principle has not been em-

ployed before although both Briscoe[18] and Fischer[19] have used similar methods. By using the optimal frequency the denervated muscle can be made to contract with a smoothly fused tetanic contraction. Within the last four years evidence has been presented by Fischer,[19] Solandt,[20] Hines,[21] Grodins, Osborne and Ivy[22] and Gutmann and Guttmann[23] showing that electrical stimulation of the denervated muscle can markedly diminish the rate of atrophy and loss of strength. At present similar work is being done on the denervated muscles of patients at our own medical school. To be effective in retarding muscle atrophy and loss of strength the following factors must be observed: (1) a modulated A.C. with the proper carrier frequency must be used; (2) virogous exercise is essential, i.e., work must be done by the muscle; (3) long periods—broken up in several sessions—of stimulation are necessary; (4) treatment must be started early; (5) a tetanic type of contraction must be obtained to secure maximal tension of the fibers stimulated.

In the treatment of amputations physical medicine can be most helpful. The circulation of the stump can be stimulated, edema decreased, adherent scar tissue loosened, and muscle tone and strength improved. In amputation of the lower leg, contractures can be prevented. The stump can be shrunk and toughened by using the simple apparatus illustrated in Fig. 4. In this manner much time can be saved and less difficulty is encountered in learning to use an artificial limb. Naturally, re-education exercises play an important role in the rehabilitation of these patients.

The causes of backache are diversified and may result from any of a large number of causative factors. However, I should like to suggest careful attention be given to manipulative therapy as outlined by Jostes.[24] He has approached the problem from an anatomical viewpoint. In a recent article[25] he states, "In recent years the surgical approach in the treatment of painful backs and sciatic irritation has done much to mask the rationale of conservative treatment. It has been proved that operation is not always indicated for disc involvement, and in many instances is futile." According to Jostes active treatment of low back pain consists of bed rest, heat, massage, manipulation, support, exercise and operation. It is not enough to secure relief of pain. Such a course only invites chronicity. Supportive measures such as exercise, postural correction with support, postural rest, heat, massage, bed correction, and so on are essential to continued relief.

Attention should be called to an excellent and recent book entitled "Pain Mechanisms. A Physiologic Interpretation of Causalgia and its Related States" by Livingstone.[26] The book contains a rather challenging chapter on low back pain disability. Livingstone believes that novocaine injected into certain sensitive "trigger points" is worthy of a trial both as a means for determining the source of pathologic reflexes and as a method of treatment. He does not believe it to be a panacea but merely a useful adjunct to other treatment. This is of special interest in view of some recent work by Weddell, Feinstein and Pattle.[13] These authors write, "Elliott has drawn attention to the fact that tender spots or nodules supplied by 'irritated nerve roots' are the seat of increased motor unit activity—there is a close parallel as regards spontaneous repetitive motor unit activity, between the findings in fasciculation induced by prostigmine and certain cases of sciatica. Pain in the nodules is abolished by the local infiltration of procaine. And the suggestion has been put forward that the spasm itself is the source of the pain. Our findings, however, suggest that the pain in sciatics may be the result of changes in sensory nerves which parallel those occurring in motor nerves."

Copeman and Ackerman[27] have shown that these "trigger points" are associated with certain areas of the back where pink fatty tissue of a particular type lies between the superficial and the deep fascia. The fat is vascular and liable to become edematous and congested, possibly under the influence of meteorological and other influences, and may thus narrow the lumen of the tendon sheaths and cause stiffness and pain. A similar effect may arise in other situations, and this furnishes a far more convincing explanation of the characteristic symptoms of acute lumbago than many other theories. This underlying fat, when congested and swollen, tends to bulge through any weak spots of deficiencies in the enveloping fibrous layers or through the foramina which gives passage to the nerves and blood vessels; these herniations form tender nodules and trigger points.

Space will not permit discussion of such conditions as causalgia or phantom limb pain. However, Livingstone gives an excellent discussion of both these distressing pathologies. Nor will space permit a discussion of the role of physical medicine in the treatment of infections and many other industrial hazards.

The importance that occupational therapy plays in the proper economic adjustment of the injured workman should be stressed. The first step in rehabilitation is to obtain the cooperation of the patient and awaken his will to recover. This type of occupational therapy should be prescribed by a physician, for the successful application of this therapy demands a thorough knowledge of physiology, pathology, and bodily mechanics. In planning the treatment of an injured workman the physician should keep in mind Griffiths'[28] theory of conditioned reflexes. He states, in part: "The conditioned reflex adds the power producing factor of repetition, and this in the deliberately acquired reflex was originally the result of conscious effort. Impulsive action, although not a true acquired conditioned reflex, is produced by the cortical memory of deliberate action freed by practice from the psychological inhibitions associated with conscious deliberation. Deliberate action becomes an effort of will power or thought; but for deliberate muscle action to be developed into a state of skilled muscle action a period of training is necessary, requiring concentrated mental effort and practice, and this can lead to the desired skilled action as experience is obtained. Finally, something more is needed before the skill becomes expert. This extra something is not only experience but represents a definite advance in pure psychical effort." Most injured workmen can and should receive ambulatory treatment, and this must be designed to insure that they use their conditioned reflexes and so secure the maximum amount of exercise with the minimum amount of fatigue.

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The Consultant in Relation to the Plant Physician

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THIS article is written entirely from the point of view of the plant physician. It is intended to discuss the ways by which the consultant to whom a patient is referred can assist the plant physician in adequately fulfilling his duty to the employee, the employer and the insurance carrier. The responsibility which the plant physician owes to the consultant is equally important and will be at least implied throughout the article if not actually described.

On behalf of the specialists, it must be said that when a consultant's duty is to be done for industry, the consultant's lot is not a happy one. This is because the industrial case reaching him is too frequently a problem already, or it would not be referred. Those run-of-the-mill cases which present no particular difficulty, professionally or from an industrial relations point of view, are handled entirely by the plant medical staff. It is only the case which is particularly difficult, medically or surgically, or who presents a complicated personal or compensation problem who is likely to be seen by the specialist.

In discussing the relationship of the consultant to the plant physician, the important points are listed numerically for the sake of brevity.

1. ATTITUDE TOWARD THE PATIENT. Those consultants who treat industrial cases as though they were private patients inevitably produce the most satisfactory end results. This is accomplished by the satisfactory mental attitude adopted and maintained by the patient throughout his disability due to the consideration given his ego, as well as the therapeutics which have been directed toward the ailment. When industrial patients are segregated, slighted, or allowed to wait unduly long while private patients are given a priority, they develop an attitude of resentment which may be translated into resistance to cure and a perpetuation of symptoms.

It seems almost presumptuous to stress this point, and yet its emphasis is justified. Technical skill applied to a lesion may result in an anatomical healing, but dissatisfaction on the part of the patient for any reason may constitute a psychic cause of symptoms from a lesion somatically healed. Those who have referred many patients from industry have learned to evaluate consultant's attitude by the attitude of the patients as they return to their hands. Their first question is likely to be, "How did you like Dr. Blank?," and when the employee answers, "Fine," with a gleam in his eye, a good end result is extremely likely. On the contrary, if the "Yes" is supplied hesitantly or a qualified answer is given, and the patient appears slightly uncomfortable, a danger signal has been sounded. This picture does not have to be presented often before the use of a different consultant is indicated.

It must be emphasized that this attitude of the patient may constitute no reflection on the professional skill of the consultant concerned. It may well be that the lack of individual attention which has caused the dubious attitude is an attribute to a professional skill so outstanding that the consultant just cannot give the individual the attention he himself would wish to. Nevertheless, the use of this consultant may still be contraindicated, or his use reserved for those cases in which his skill is so essential that the patient's mental attitude becomes secondary.

2. THE CONSULTANT AND THE PLANT PHYSICIAN SHOULD BE PROFESSIONALLY ACQUAINTED WITH EACH OTHER. This does not imply that the social acquaintance is necessary, nor do they need ever to have seen each other. The acquaintance may be purely on the basis of telephone calls, or even on the basis of knowing each other through reputation. It must be remembered that the patient is being transferred from the plant physician to the consultant's care, either for a single visit or for prolonged treatment. Eventually, if not immediately, he must be returned to the care of the plant physician. The patient may not often enough recognize the reason for which the transfer is made, nor the necessity for it. If he is passed back and forth between two obvious strangers, he is bewildered. He will be more willing to accept his transfer if it is apparent to him that there is mutual respect between the two physicians.

3. PROMPT INTERCHANGE OF INFORMATION IS ESSENTIAL. This is probably the most important point of all, and its lack causes the greatest impediment to the success of the physician. A note or telephone call from the plant physician to the consultant will give him the background of the case and the history to date. While very highly desirable, this is not imperative since the consultant usually obtains his own history from the patient and usually carries out a complete examination regardless of any medical information obtained from the plant physician.

When the patient returns from the consultant to the plant physician, however, the picture is entirely different. If the plant physician receives no communication from the consultant, by telephone or mail, he is at a complete loss to advise the employee as to any

new course of action as a result of the visit to the consultant. It may be that the patient has been advised by the consultant, and he translates this advice to the plant physician. But not all patients can give a coherent, objective, or reliable account of the advice. Consequently, the plant physician must either express approval of a program which may not have been interpreted correctly, or stall for time until he does receive confirmation. Either situation is awkward.

In most cases, the consultant dismisses the patient with a promise that he will write the plant physician. The plant physician usually admits that he has not yet heard, and is likely to request the patient to return in a given number of days when the letter should have been received and promptly forgets about the matter until the patient returns at that time, too often with still no letter having arrived. The plant physician is losing face and the employee is losing confidence. The plant physician has lost control of many a patient because of this type of situation. When the complete report arrives, it may be long, sound, helpful and impressive, but it has lost its force because it is stale. The consultation which was urged upon the patient as being important has been apparently treated as unworthy of prompt attention by the physicians concerned.

It is, of course, realized that consultants cannot keep up with mailing their comprehensive reports each day, and yet the beneficial possibilities of such consultations are lost innumerable times because of delay.

It is my belief that there is only one satisfactory way to meet this situation, and the usefulness of a consultant may be measured greatly by his willingness to meet the situation by this method. I believe a telephone call to the plant physician on the same day that the patient was seen by the consultant is the only satisfactory procedure which can be followed. The written report may follow at the convenience of the consultant and his secretary. No matter how soon the patient returns to the plant physician, he is prepared to pick up the situation as it stood at the consultant's office and carry it through with an intelligent explanation and with sound advice. Confidence in both the consultant and the plant physician is maintained by the patient, and respect for the profession is increased. I, personally, consider this method not only desirable but obligatory if satisfactory service is to be rendered to the patient.

4. ATTITUDE TOWARD THE PLANT PHYSICIAN. As a rule, the attitude of the consultant towards the plant physician is wholesome and is one of respect for a man who is competent in his own special field. There are exceptions where a consultant living in his ivory tower adopts an attitude of superiority and criticism toward the procedure of the plant physician in a given case and who consciously or sub-consciously plants a seed of discontent in the mind of the employee toward his plant physician. The plant physician is usually adequate to meet the needs of any given situation and refers the patient to a specialist in any branch which calls for a higher skill than his own. If he knew, or thought he knew, as much as a specialist in any field, there would be no need for consultants; and this article would not be written. The plant physician has usually impressed the patient with the particular skill of the consultant to whom he has referred the patient. For the consultant to further attempt to gild the lily in his own favor is unnecessary, and in the long run, usually reflects unfavorably on him. Fortunately, this comment applies to a small percentage of consultants, but those few call forth this protest, which we feel will have the endorsement of the many.

The Thymol-Barbitone Test in Clinical Practice

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ANCILLARY to an investigation of the thymol-barbitone test in experimental carbon tetrachloride intoxication[1] the serum or spinal fluid of 712 hospital patients was examined. In part these examinations were of specimen routinely collected; a smaller number represents selected cases. In addition 82 industrial workers were tested.

Historical

IN THE course of an investigation of Gray's serum colloidal gold reaction carried out by Maclagan in Staines County Hospital, Middlesex, England, the need arose for buffering of the chemical system, and for the presence of a mild antiseptic. For the buffer Maclagan selected barbitone and for the antiseptic, thymol. Maclagan states:

"In an attempt to inhibit the growth of moulds in the barbitone buffer (pH 7.8) a crystal of thymol was at first added to the solution, and as the thymol gradually dissolved it was noted that the buffer acquired the property of producing a turbidity or precipitate with certain sera."

Out of this somewhat accidental disclosure has evolved the thymol-barbitone test, for which Maclagan prefers the term "thymol turbidity test," and which he has chiefly associated with liver dysfunction, but which may have broader applications. Maclagan's first reports[2, 3] appeared in 1944.

Test Materials and Procedures

WE HAVE somewhat closely followed Maclagan's details of method as now presented:

Preparation of Thymol Buffer or Precipitant
(pH 7.8)
Ionic Strength = 0.01

Add 500 ml. of distilled water to 1.38 g. of barbitone, 1.03 g. of sodium barbitone and approximately 3 g. of thymol. Heat just to boiling point, shake well, and cool thoroughly. The mixture should now be turbid. Seed with a small amount of powdered thymol crystals, shake, and allow to stand overnight at a temperature of 20 to 25°C. Finally, again shake well (to avoid supersaturation) and filter the clear solution from the crystalline deposit. It is not possible to shorten this technique by weighing out an exact amount of thymol, because there is some interaction between the thymol and the barbitone on heating, presumably esterification, and an excess of thymol must be present to ensure saturation. The solubility of thymol is significantly reduced below 20°C; the buffer should therefore be stored in a warm place in cold weather.

Procedure

Measure one volume of serum (0.05 ml. from a 0.2 ml. graduated pipette with a waxed tip) into a dry tube and add 60 volumes of buffer (3 ml.). Allow to stand for half to one hour, and compare in a comparator with a black line on a white background

against the turbidity standards of Kingsbury et al. (1926). When the result is positive flocculation frequently occurs on standing overnight, but this is not an essential part of the test. If the turbidity exceeds the 100 mg. per cent standard, dilute with a further measured volume of buffer as required. The result is expressed in arbitrary units equal to the appropriate standard divided by ten with allowance for dilution. The standard dilution is 1 to 60, so that if the final dilution is 1 to 120 and the mixture then matches the 70 mg. per cent tube, the result is 14 units. Expressed as a formula:

$$\text{Units} = \frac{\text{Standard tube reading} \times \text{Final dilution of serum}}{600}$$

Normal limits are 0 to 4 units. The reaction is partly abolished by heating to 56°C for 30 minutes, so that inactivated sera cannot be used.

Maclagan has indicated the pronounced differences in test results attributable to variation in pH and other ionic values, in the following data:

TABLE I.
TURBIDITY IN ARBITRARY UNITS PRODUCED BY ADDING 3 ML. OF THYMOLIZED BUFFER TO 0.05 ML. OF SERUM UNDER DIFFERENT CONDITIONS

	pH. 4.	5.	6.	7.	8.	9.	Ionic Strength
Normal	3	18	12	4	1	0	0.02
Inffective hepatitis	3	21	21	14	12	3	0.02
Normal	2	8	6	2	0	0	0.05
Inffective hepatitis	2	10	10	7	6	0	0.05
Normal	1	7	5	1	0	0	0.10
Inffective hepatitis	1	7	6	4	2	0	0.10

Possibly related to the foregoing is the observation from our own examinations of variations in results when the amount of test material, sera or otherwise, added to fixed quantities of the thymol precipitant. For example: When one milligram of certain substances in solution is added to the standard quantity of thymol precipitant, four units of turbidity may arise. If four milligrams of the same material be introduced instead of 16 units of positivity appearing, only two may be in evidence. Continued further, the addition of eight milligrams may lead to an entirely negative response. This may be akin to the "inhibition zone" phenomenon of Heidelberger.[4]

Although the originator of this test points out that inactivation of sera may interfere with results, we have not found any greater diminutions in values than two units. This is of no great significance in high values, but obviously is of some importance at the border line of four units, which figure is accepted as the probable upper limit of values for normal individuals. Many of our results are based on inactivated sera and without known diagnostic detriment.

Preparation of Standards

THERE are available a number of laboratory instruments that automatically or semi-automatically establish turbidometric readings. Since these are not found in the average hospital or clinical laboratory, reliance may be placed upon the well known graduated tube standards for urine protein estimation. Their preparation has been described by Kingsbury, Clark, Williams, and Post[5] and by King[6] among others. The details now are shown here, which are chiefly derived from the publication by King.

"Preparation of the Standards: The gelatin is clarified as follows: 65 grammes of pure gelatin are dissolved at about 90°C in 500 c.cm. of water. The 'white' of one egg, in approximately twice its volume of water, is vigorously stirred into the solution. The mixture is heated, with continual stirring, on a boiling water-bath for one hour. It is then filtered through a large coarse paper in a heated funnel. The clear, slightly yellow filtrate is kept liquid at about 50°C for the preparation of the standards as they are described below.

"The formazin is prepared as follows: 25 c.cm. of an aqueous solution (10 g. per 100 c.cm.) of hexamine (hexamethylene tetramine) are added to 25 c.cm. of a solution (1 g. per 100 c.cm. in water) of hydrazine sulphate. The mixture is stoppered, shaken, and left at room temperature for at least 15 hours. The resulting precipitate of formazin is carefully mixed by gentle shaking until it is evenly dispersed throughout the liquid.

"Fourteen and one-half c.cm. of the suspension are added to 100 c.cm. of gelatin together with 0.3 c.cm. of 40% formaldehyde to ensure permanent 'setting.' Such a gelatin suspension of formazin has been found to be equivalent to a concentration of serum albumin (precipitated with sulphosalicylic acid under the conditions described above) of 100 mg. per 100 c.cm. The gelatin suspension is now diluted with clarified gelatin (containing 0.3 c.cm. of 40% formaldehyde per 100 c.cm.) to give standards corresponding to other albumin concentrations. The following mixtures of gelatin and formazin-gelatin suspension are made in small tubes of uniform bore (7.5 by 1 cm.)."

TABLE II.

Tube	C.cm. of Gelatin	C.cm. of Gelatin-formazin	Value in terms of Albumin per 100 c.cm.
1	3.6	0.4	10
2	3.2	0.8	20
3	2.8	1.2	30
4	2.4	1.6	40
5	2.0	2.0	50
6	1.6	2.4	60
7	1.2	2.8	70
8	0.8	3.2	80
9	0.4	3.6	90
10	0	4.0	100

When cold, the tubes are stoppered with corks cut level with the top of the tube. The stoppered ends are then dipped in molten paraffin wax and allowed to cool.

The standards may be checked against serum solutions standardized by nitrogen determinations. They should be mounted in a wooden rack painted black. Comparison is best made by viewing them against a strip of white cardboard with a transverse black line fastened to the rack.

For animal experimental work it was necessary to prepare standard tubes indicating fractions of one thymol unit.

In our own experience it has proved desirable to make full effort to remove from the gelatin all possible traces of its usual straw color. Although this test is turbidometric and not colorimetric the fact that the standards may be tinged with straw color, and the test materials tinged in bluish fashion, may introduce at least annoyances when comparisons are made visually. Contrary to King's recommendation of "vigorous stirring," clarity at times may be facilitated by avoiding stirring.

Kingsbury specifies that the best-suited grade of gelatin at the time of his investigation was the Super X product of the Coignet Chemical Products Company, 17 State St., New York City, and that the chemicals required may be obtained from the Chemical Division of the Eastman Kodak Company in Rochester, New York.

Basis of Test

THE chemical basis for this procedure is not fully known. Maclagan has carried out chemical analyses of the precipitate as shown in Table III.

TABLE III.
COMPOSITION OF PRECIPITATE IN FIVE CASES

Diagnosis	Infective hepatitis	Infective hepatitis	Infective hepatitis	Rheumatoid arthritis	Cirrhosis	Averages
Mg. of ppt. per 100 ml. serum	1050	1400	1300	1700	1330	—
Units of turbidity	8	16	9	27	13	—
Mg. % per unit	130	88	145	63	102	106
N %	5.4	4.7	6.7	6.4	7.2	6.0
Protein %	33.8	29.4	41.8	40.0	45.0	37.5
P %	0.45	0.47	0.30	0.27	0.18	0.33
Lecithin %	10.9	11.4	7.3	6.5	4.5	8.0
Thymol %	35	32	31	32	30	32
Cholesterol % (x 1.4)	14.7	20.4	14.7	19.7	13.6	16.5
Recovery %	95	93	95	99	92	95

These findings caused their investigator to label the test as a measure of a globulin-phospholipin-complex, but at all times his written emphasis is on gamma-globulin or some closely related globulin function. Our own observations appear to veer away from the concept that this test constitutes a measure of the gamma-globulin present. Gamma globulin in essentially pure form in aqueous solution provides no positive results while the phospho-lipins, apart from gamma-globulin, consistently led to heavy reactions. In all our clinical material ,the highest positives derived from patients with known lipemias (not including cholesterolemia). In certain instances in the presence of weakly positive determinations, the addition of traces of gamma-globulin (itself negative) enhances the degree of positivity. It appears possible that gamma-globulin may enter or may influence the precipitation phenomenon without constituting the chief precipitate.

TABLE IV.
POSITIVE THYMOL TURBIDITY TESTS IN A HOSPITAL POPULATION

Total Examinations.....545
Negative.....515
Positive..... 30
% Positive in Hospital Population..5.5

PATHOLOGY ASSOCIATED WITH REACTORS

Case No.	Thymol Units	Chief Diagnosis
9989	10	Hepatitis; Enlarged Liver; Possible sumac poisoning
9211	5	Infectious hepatitis
7835	6	Cirrhosis; Ascites
8292	4	(?) Cirrhosis; (?) Carcinoma of liver; Senile dementia
9491	14	Cirrhosis
7607	4	Catarrhal jaundice
6635	4	Lupus erythematosus
		At autopsy—enlarged liver, bronzing, hepatitis, possible initial yellow atrophy
9350	4	(?) Weil's Disease; enlarged liver
7506	4	Alcoholism
7503	4	Senile dementia; cardiovascular disease
7784	5	Senile psychosis; cardiovascular disease
7510	4	(?) Psychosis; Schizophrenia
8616	10+	General paresis
G.C.	4	Possible skull fracture
E.M.	7	Pyelo and glomerulo-nephritis
7945	5	Carcinoma; urinary bladder
8762	5	Uterine carcinoma
6650	4	Anemia
6588	8	Pelvic inflammatory disease
7505	4	(?) Renal calculus
7357	4	Bronchial pneumonia
7582	4	Phenol poisoning; terminal uremia
7871	4	Iodine poisoning
7852	4	Phlebitis of legs with ulcer
7864	4	Diabetes; cellulitis
8599	4	Peptic ulcer
8896	4	Bacterial endocarditis
9024	5	Rheumatic heart disease
8983	4	(?) Apoplexy
8674	4	Malaria

Equally uncertain is the point of origin of the substances responsible for the reaction. A damaged organ may provide the reactive materials or instead some common point of origin may exist such as the reticuloendothelial system. The phospho-lipins are present in all tissues at least in higher life forms but notably in the brain and liver. In any event the test is not regarded as a measure of functional impairment but as a mark of disturbed metabolism.

Findings from Human Sera, Plasma, and Spinal Fluid

THE greater portion of our examination material was obtained from the laboratory of one hospital. During the period of routine examination only positive results were investigated as to the clinical situation. In some selected groups both negative and positive findings were associated with clinical diagnoses. On this basis reports are now tabulated:

Selected Groups

Request was made of the hospital services for serum specimen from the following categories: (a) conditions in which cholesterol determinations were indicated, (b) conditions in which spinal fluid examinations were indicated, (c) psychoses, both on organic and functional basis, (d) liver involvement and (e) diabetes.

Varying numbers of all were furnished but not always identified by diagnoses and in the aggregate of 168 specimens of this somewhat selected but still general group, 20 reactors (12%) were detected. Greater detail is presented in tables V and VI and subsequently.

Thymol Turbidity Tests and Cholesterolemia

Fifty-two examinations have been carried out seek-

TABLE V.
THYMOL TURBIDITY IN RELATION TO BLOOD CHOLESTEROL

Case No.	Cholesterol Value	Thymol Units	Case No.	Cholesterol Value	Thymo Units
	mgs/100 cc blood			mgs./100 cc blood	
9617	165	2	14621	250	1
			F.S.	167	1
9119	133	2	10989	115	.8
	109	.6	11624	226	1
	139	1	11591	333	27 (3)
			10474	154	.8
10377	108	2	11732	166	.8
8983	304	1	11603	122	1
10451	179	2	9777	180	1
9851	216	1	9711	150	1
9802	155	.8	11807	375	2
73142	231	.8	72192	240	.8
9711	117	2	74289	304	1
10472	140	9 (1)	12073	100	1
10443	180	2		71	.8
10704	171	1		94	1
10720	90	6		114	1
10718	82	5 (2)		101	1
10694	134	.8	12160	98	2
10545	174	1	11507	180	2
10753	137	3	11430	516	2
9802	162	.8	11591	131	2
8963	195	2			
10855	117	8	12516	170	3
10969	138	1		146	2
9777	158	2		152	3
11243	178	1	80555	151	1
	215	1		175	1
	194	1			
	230	2	12245	242	1
			12138	253	4 (4)
11175	155	1	12624	139	9 (5)
11322	178	1	12207	128	1
10302	130	.8	12866	195	1

(1) Hepatitis (2) Peripheral neuritis; hyperthyroidism (3) Diabetes; lipemia
(4) Infectious hepatitis (5) Generalized arthritis; disseminated lupus

TABLE VI.
THYMOL TURBIDITY IN PSYCHOSES

Case No.	Thymol Turbidity Units	Chief Diagnosis
13195	2	General paresis
14003	2	Schizophrenia
13466	1	Paranoid schizophrenia
13915	1	Schizophrenia
12744	2	Schizophrenia
13838	1	General paresis
12883	3	Organic brain disease
13635	1	Psychosis; Circulatory disturbance
11294	2	Psychosis with organic brain disease
12022	1	Schizophrenia
12403	2	General paresis
12389	.8	Korsakoff's syndrome; Alcoholism
12663	3	Korsakoff's syndrome
11640	3	Paranoid schizophrenia
12599	.8	General paresis
11751	1	Cerebral Arteriosclerosis
12012	1	General paresis
12413	2	Psychosis with mental deficiency
11954	2	Epilepsy with mental deficiency
C. P.	.8	Acute alcoholism

ing any correlation between thymol turbidity and the cholesterol content of the blood. The results appear in Table V.

Although five positive thymol turbidity tests were established in this series it does not appear that there exists any clear cut linkage between these two phenomena.

Psychoses

From this small group of psychotic states it is not evident that the thymol turbidity test is of positive significance.

In the absence of complete diagnoses of numbers of negative reactors the trend of findings from a single day's examinations of a miscellaneous lot of 19 is tabulated in Table VII.

Spinal Fluids

Nineteen spinal fluids were examined. In Table VIII the laboratory findings are recorded. All thymol turbidity tests were wholly negative.

Controls

For the purposes of establishing the degrees of positivity of thymol turbidity tests in persons in apparent good health, two series were examined aggregating 82 individuals.

In the first (Table IX) 30 workers who applied for industrial work or otherwise representing candidates for food handlers examination were tested. The second group of 52 persons embraces industrial workers in the chemical industry who were exposed to mis-

TABLE VII.
TREND OF THYMOL TURBIDITY TEST IN LIVER AND OTHER ABDOMINAL STATES

Case No.	Thymol Turbidity Units	Chief Diagnosis
14153	2	Cirrhosis
U. N.	5	Cirrhosis
12657	4	Cirrhosis
13736	1	Cirrhosis
13887	4	Cirrhosis
13681	4	Portal cirrhosis
13612	2	(?) Cirrhosis; Primary carcinoma of liver
13273	.8	Primary carcinoma of liver with metastasis
14223	6	Infectious hepatitis
13590	1	Infectious hepatitis
Dr. P.	7	Liver abscess
13342	1	Catarrhal jaundice
D.O.D.	4	Exposed to carbon tetrachloride
C. P.	.8	Acute alcoholism
A. K.	10+	Lipemia
12972	.4	Diabetes
13773	.6	Diabetes
14220	2	Diabetes
14062	.6	Gastrointestinal malignancy with brain metastasis

TABLE VIII.
THYMOL TURBIDITY TESTS ON SPINAL FLUIDS

Case No.	Thymol Turbidity Units	Laboratory Findings
13015	0	Globulin—positive; Colloidal gold—5,5,5,4,3,3,2,1,1,0. Kline—positive
Y. S.	0	Globulin—negative; Colloidal gold—negative; Kline—negative
12865	0	Globulin—negative; Colloidal gold—negative; Kline—negative
13146	0	Globulin—negative; Colloidal gold—negative; Kline—negative; Total protein .25 gms. per liter
12947	0	Globulin—faint trace; Colloidal gold—negative; Kline—negative
13063	0	Globulin—negative; Colloidal gold—not run, too many red cells; Kline—negative
13134	0	Globulin—negatives; Colloidal gold—negative; Kline—negative
13178	0	Globulin—negative; Colloidal gold—negative; Kline—negative; Total protein .20 gms. per liter
13085	0	Globulin—negative; Colloidal gold—negative; Kline—negative.
13278	0	Globulin—faint trace; Colloidal gold—2,2,2,3,1,1,1,0,0,0; Kline—positive
13123	0	Globulin—negative; Colloidal gold—negative; Kline—negative
13320	0	Globulin—faint trace; Colloidal gold—negative; Kline—negative
13342	0	Globulin—negative; Colloidal gold—negative; Kline—negative
13182	0	Globulin—positive; Colloidal gold—2,2,2,3,3,1,1,0,0,0; Kline—positive
13413	0	Globulin—negative; Colloidal gold—negative; Kline—negative
13437	0	Globulin—negative; Colloidal gold—negative; Kline—negative
J. C.	0	Globulin—negative; Colloidal gold—negative; Kline—negative
13195	0	Globulin—2+; Colloidal gold—5,5,5,4,3,3,2,1,0,0; Kline—positive
12123	0	No laboratory information

TABLE IX.
NORMAL CONTROLS

Case No.	Thymol Turbidity Units	Case No.	Thymol Turbidity Units
M. T.	3	E. P.	3
M. B.	2	M. L.	2
D. H.	1	C. M.	3
W. M. W.	3	J. S.	1
B. C. H.	4	L. K.	2
P. L. J.	3	M. K.	2
J. W.	2	J. S.	3
A. C.	3	J. P.	2
L. B.	2	J. R.	2
D. J.	2	J. D.	1
N. T.	3	I. G.	1
B. E.	1	M. F.	2
D. S.	3	L. M.	1
D. A.	4	P. D.	1
N. K.	2	P. W.	2

TABLE X.
CHEMICALLY-EXPOSED CONTROLS

Case No.	Thymol Turbidity Units	Case No.	Thymol Turbidity Units
1	2	27	2
2	2	28	1
3	.6	29	.6
4	3	30	.8
5	3	31	2
6	5	32	2
7	5	33	.8
8	2	34	.8
9	2	35	1
10	.8	36	3
11	.8	37	3
12	2	38	5
13	2	39	5
14	4	40	1
15	2	41	1
16	3	42	2
17	3	43	1
18	3	44	.8
19	1	45	.8
20	3	46	1
21	3	47	1
22	2	48	4
23	2	49	1
24	2	50	2
25	.8	51	2
26	.8	52	1

cellaneous chemicals, some of which are known to be toxic, but the concentrations were below known consequential quantities.

For our purposes, and following the lead of Maclagan, any degree of positivity at or above four thymol units is accepted as representing potential pathological qualities.

However, by practice, any turbidity greater than any one standard tube such as five or seven is arbitrarily graded at the next highest unit. Thus a 3.4 reading would be recorded as four etc. Only true fours and above, approach and enter the realm of pathology. Some fours and all below, including many which are wholly negative, are rated as lying within the normal zone.

Maclagan's Clinical Experience

IN SUPPORT of his concept of the nature and significance of the thymol-barbitone test, Maclagan has published extensive tabulated data, some which is now excerpted in Tables XI and XII.

TABLE XI.
THYMOL TESTS IN 248 CASES OF LIVER DISEASE

Diagnosis	No. of Cases	Per cent. thymol positive	Thymol Units. 0-4.	5-7.	8-10.	11-15.	16-20.	21-25.	26-30.	Means and st. errors.
Infective hepatitis	134	91	12	22	51	30	14	4	1	10.2 ±0.42
Cirrhosis	13	100	0	2	4	3	1	2	1	14.2 ±1.96
Arsenical	32	47	17	11	2	1	1	0	0	5.1 ±0.60
Weil's disease	23	52	11	9	3	0	0	0	0	5.1 ±0.46
Amyloidosis	7	14	6	1	0	0	0	0	0	1.7
Obstructive jaundice	39	7.7	36	3	0	0	0	0	0	1.2 ±0.27

In connection with the content of Table XI he makes, among other items, this comment:

"It will be seen that the test is usually positive in infective hepatitis (91%) and in cirrhosis and is mainly negative in obstructive jaundice. No obstructive case had a value above seven units, and 75% of those in the first two groups were above seven units. In post-arsphenamine jaundice and in Weil's disease about half the results were positive, and amyloidosis gave mainly negative results. In infective hepatitis the turbidity was usually maximal at or soon after the onset of jaundice, and frequently remained positive for many weeks after the serum bilirubin became normal."

And of Table XII the following comments, among others:

"It seems reasonable to assume that all the positive reactors may have had some degree of liver damage and confirmatory tests were attempted in eight of these cases: four had urobilinuria, one was jaundiced (glandular fever), one had a raised serum globulin (lymphogranuloma), and one had a galactose index of 190 (normal 0-160)."

TABLE XII.
THYMOL TESTS IN 217 CONTROL PATIENTS

Diagnosis	Number of cases	Number thymol-positive	Thymol Units
Glandular fever	4	4	16, 14, 13, 5
Rheumatoid arthritis	8	3	6, 6, 6
Heart failure	13	3	6, 6, 5
Pernicious anaemia	8	3	7, 6, 6
Chronic osteomyelitis	2	2	7, 5
Pulmonary tuberculosis	18	1	7
Nephritis	8	0	—
Peptic ulcer	18	0	—
Lymphogranuloma	1	1	17
Atypical pneumonia	1	1	8
Pyonephrosis	3	1	6
Cholecystitis	3	1	5
Volvulus	1	1	5
Normal pregnancy	12	0	—
Others	117	0	—
Totals	217	21	

All considered, Maclagan appears to associate this test exclusively with liver damage and exclusively with gamma-globulin or some similar globulin, in the following language:

The thymol turbidity test does not test any known function of the liver, and should be regarded as an indicator of disturbed liver metabolism rather than as a function test. The following evidence, although indirect, strongly suggests that it is related to the serum gamma globulin content, or to some closely similar globulin fraction: The protein in the precipitate is of the eu-globulin (high molecular weight) type. There is a strong correlation with the serum colloidal gold reaction which is known to depend mainly upon gamma globulin (Kabat et al.).[7] The test is chemically and clinically related to the cephalin-cholesterol test,[8] which is also concerned with gamma globulin.[7]

The predominance of positive results in infective hepatitis and cirrhosis follows the known increase of gamma globulin in these conditions (Gray and Barron).[9]

Summary

THE thymol-barbitone test, also termed the thymol turbidity test, is described. Some of the clinical experience of its originator is reviewed, and his appraisal of the field of application of the test is set forth. In our own inquiry, in the population of a general hospital, the number of reactors among 712 unselected or little selected patients was 49, or 6.8% of the patients who were tested.

No reactors were detected from spinal fluid examinations; few among psychotics. Liver damage was indicated in the greater number of our reactors, but the validity of the test from our limited investigation is lower than appraised by Maclagan. No reactors were detected among 30 presumed healthy individuals who were tested.

Among 52 chemical workers variously exposed as to substance, degree, and time, four reactors were encountered.

This latter control group is not representative of industrial workers in general. Positive results at and above four thymol units suggest pathology, with outstanding implications of the liver.

The thymol-barbitone test is not a measure of liver function. Instead it marks disturbed liver (and other organs?) metabolism.

[ACKNOWLEDGEMENTS: In the conduct of this work we have had the excellent cooperation of the Detroit Receiving Hospital, Detroit, Michigan, through DRS. B. E. STOFER and M. B. CONOVER.]

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Illness in Industry

CHARLES-FRANCIS LONG, M.D.,
Chairman, Commission on Industrial Health and Hygiene, Medical Society of the State of Pennsylvania, and Medical Director, Bayuk Cigars Incorporated

THIS conference is being held at a unique time in our medical lives. We have just been exposed to a much needed lesson on the relationship of sickness to work, and we are now going to be placed on our mettle to show just how well we have learned that lesson. Up to now on the battle front, medical officers have seen whole divisions crippled by dengue, let us say, and yet the work assigned to that division somehow managed to get done. In industry we physicians at one time during the war saw whole working populations suffering epidemic upper respiratory infections or grippe, and yet the work on which the war front depended got done on schedule. From these facts the deductions are obvious—either the sick carried on at their posts, or the epidemics arranged themselves in a particularly propitious order. Since we know epidemics do not arrange themselves for our convenience, we rightly conclude that those not too ill kept right on working. We physicians learned the lesson that possibly we had previously been a little too rigid in sending every worker home whose cold in the nose resulted in a temperature rise to 99 1/5°. Many who had a cold with a little fever didn't even report to our dispensaries but kept right on working. This is no callous argument for working the ill until they must necessarily break down and lose time. It is an argument for the use of that most difficult art to acquire, the art of clinical judgment in dealing with industrial workers. It is also an argument for the use of prophylactic therapeutics in an attempt to control minor illnesses, prevent them from becoming anything more, and consequently prevent them from causing the individual to lose time.

Ours are the questions: What is the illness load? How much loss of time does it cause? From the answers, we proceed to the questions—How can we prevent these illnesses? How can we manage those who acquire them?

We are omitting from this discussion all true occupational illnesses, and focusing our attention only on those which have no causation in work.

Concerning, then, *only non-occupational illness*:

(1) *How much illness is there?* Nobody knows the true answer to this question, but the U. S. Public Health Service has made several studies which give us reason to estimate rather accurately that if the present rate prevails there may be 6,728,000 sick absences among working men this year that will last eight days or more. And if those 60,000,000 jobs materialize, 12% of our working force will be away from work more than a week because of illness. The U. S. Public Health Service warns that our industrial illness rate is increasing, having reached a high in the first quarter of 1944 not attained during the decade 1934-1943. "The 1945 rate for all causes (168.2 absences per 1,000 males) is only 2% below the rate of 171.8 recorded for the corresponding quarter of 1944, a rate which had not been equalled or exceeded in any of the first quarters of the years 1935-43, inclusive. . . . While the frequency of all sickness was relatively stable during 1943-45, the rate for respiratory diseases dropped substantially in 1945, reflecting principally a decrease in the frequency of influenza and grippe. The rates for the digestive and nonrespiratory-nondigestive disease groups, on the other hand, increased from 1943 to 1945, both rates for 1945 being the highest of the past 10 years. With the exception of appendicitis, each of the specific digestive causes also increased over the three-year period, while each of the specific nonrespiratory-nondigestive causes yielded a frequency for the first quarter of 1945 which equalled or exceeded the corresponding rate for 1944. Thus it will be observed that, although no respiratory epidemic similar to that of 1943-44 was recognizable in 1944-45, the increase in the frequency of digestive and nonrespiratory-nondigestive diseases was sufficiently great in the first quarter of 1945 to yield a total sickness rate almost as high as the sickness rate recorded for the first quarter of 1944, the maximum first quarter rate of the 10 years 1935-44."

(2) *How much loss of time do these non-occupational illnesses cause?*

The last full year (1943) for which figures are available at present show that the average male worker lost 11 days because of non-occupational illness, and the average female worker lost 13 days. The chief individual causes for this lost time were respiratory and digestive diseases. Men lost four days and women six days because of respiratory diseases. Digestive diseases cost men one day and women two days.

The loss of time from other "ills that flesh is heir to" cannot be broken down into average days lost, but the cardiacs, the hypertensives, the neurasthenics and the young people with infectious disease each contributed their share to the total.

(3) *How can we prevent these illnesses?*

We know a lot more than we put into practice. The keystone upon which preventive action must rest is conscientious, searching physical examination. In a large industry with the usual well-staffed medical service a decent physical examination presents no problem. But 92% of industries are small, and they do not, as a general rule, have any medical service. The first prerequisite of real preventive medical practice is absent. So the first step must be an acceptable method of getting medical service to the workers in all industry, no matter how small. We in Philadelphia have made a good start in that direction—but that is another story.

Now when we analyze the causes of sickness absenteeism we find the respiratory and digestive diseases leading the parade. If we could control them and eliminate them we would in that one stroke cut down absence by 50%. Who among us has not had his disappointments with the vaunted panaceas for the common cold? In their turn vaccines, oral vaccines and vitamin concentrates have all been weighed in the balance and found wanting. Experiments have been in progress for almost 10 years now and have proved conclusively that air-borne respiratory microbes can be completely killed in any working area by two methods. One is the ultra-violet lamp method devised by the Wells' and the other is the vaporization in air of triethylene glycol as demonstrated by Stokes and his co-workers. We cannot with certainty protect an individual against infection until we either identify the infectious agent or learn how to kill it without knowing its true name. We certainly have not yet identified the specific infectious agent of the common cold, but we do know it is air-borne and we do know that ultra-violet light or triethylene glycol spray will kill it. I hope that these methods will really prevent the spread of the common cold and allied respiratory diseases.

Presented at Five-State Regional Governmental Industrial Hygiene Conference, Philadelphia, September 25-26, 1945.

The prevention of digestive diseases is mainly a matter of education and self-discipline. During the war, our government attempted an educational campaign concerning the foods we eat, their nutritional value and a good dietary standard. Changing the food and alcohol habits of our population is a monumental task. It will not be accomplished in this generation, nor possibly the next, but, if persistent, constant educational effort is expended, the result must be better nutrition and consequently a gradual decrease in digestive diseases. For those diseases on an organic basis, education in the early symptoms and in the value of early medical advice, is our only present preventive measure.

One of the outstanding fields in which industrial medicine can aid prevention is in the eradication of pulmonary tuberculosis. When we spoke previously of "conscientious, searching physical examination" we, of course, included x-ray, fluoroscopy or fluorography of the lungs as a routine procedure. In Pennsylvania and in New York this technique has assumed large proportions, and no explanation is needed in these areas to convince industrial physicians that it is the cornerstone of the anti-tuberculosis campaign among adults. In my own industry the results have been extremely gratifying. Although the Philadelphia yearly rate runs 300/100,000, our own rate never exceeds 125/100,000 and is sometimes less. As a further preventive measure, the constant re-check of minimal and arrested cases is important. Then, too, there is a preventive aspect in the early discovery of the active case, and the following of all contacts by the public health authorities.

Thus far we have considered the amount and nature of illness among workers with some thoughts on prevention. We now turn to the final question:

(4) *How shall we manage ill workers for their own best interest, with least loss of time and with safety to their co-workers?*

From the standpoint of losing working time, sick people fall into three categories (a) Those in which it is *inevitable*; (b) those in which it *might* be avoided or forestalled; and (c) those in which it *can* really be avoided.

Lost time is inevitable in the acute contagious diseases and infections, and in the acute phases of the chronic infections. If a worker is discovered to have an acute exanthem, or a chancre, or an acute gonorrheal discharge, or active tuberculosis, that person must be separated from work immediately. Part of the further duty of the industrial physician is to make certain that the condition receives prompt and adequate treatment through some community medical resource, either private physician, clinic or hospital.

We pointed out in our beginning paragraph that there were mild illnesses during which people can work, depending on the judgment of the physician. These fall in the category where lost time might be prevented. The common cold without fever—or where the afternoon temperature does not exceed 99 2/5°—mild bronchitis, transient gastro-intestinal upsets, and the majority of menstrual complaints in women, all fall into this category. This is the group in which "preventive therapeutics" is so effective. We know that the diseases themselves are short-term and self-limited, so we aim by simple medication to make the worker comfortable while nature comes to his assistance.

We remember that our working population recently has been such that most industrial physicians have necessarily practiced geriatrics! We have become expert in conserving the waning physical strength of the older-age group to avail the country of their greater experience. Many of us have allowed individuals to work under carefully controlled conditions whom we would have categorically rejected in the late 1930's. We have discovered a great deal more working capacity in the chronic cardiac, the chronic hypertensive, the obese and the underweight than we previously thought was possible. And these people have been happy in their jobs. This has been accomplished by more careful job analysis, by better medical assay and by improved cooperation between management, labor and medicine.

The judgment and skill of the industrial physician have greatest opportunity among the third group of individuals, those for whom lost time can really be prevented. In the ordinary course of events one might be tempted to judge that their physical impairments would surely bar them from work. I have deliberately chosen two individuals to illustrate my point. If such people can be kept happily at work, how many more with lesser impairments must there be who can be employed. Both these persons had the same condition—chronic heart disease with auricular fibrillation, but each had a different job classification.

The first was a man of 65 who joined our company in 1932 and worked steadily until he resigned in 1937 at the age of 70. He never lost a day during that time from circulatory trouble. He worked from 9:00 A.M. to 5:00 P.M. He knew of his cardiac irregularity and never allowed himself to be rushed. But the times and conditions of business were not what any of us would have prescribed as an easy life for a fibrillator. For his job was being president of the company, and the years were those of great stress and anxiety.

Our second patient was first examined in 1928, when he had a mild cardiac enlargement with a regular pulse. He was then a man of 54, working as a maintenance mechanic. In 1936 he suffered an early morning attack of dysentery with an associated auricular fibrillation. From that date to this he has been fibrillating, yet lost no time for any cardiovascular reason. He works a full shift daily and it is difficult to dissuade him from doing overtime. He has never yet had any evidence of cardiac decompensation. He averages five cigars a day and has smoked tobacco for 47 years!

With both these patients it was the job of the medical department, knowing their impairment, to reexamine sufficiently often that any untoward development might be prevented—and the result has been complete satisfaction on the part of employee, corporation and physician.

In conclusion, I should like to stress that non-occupational illness produces a marked impact on the business and productive capacity of this nation. The severity of that impact can be mitigated by preventive thinking and action on the part of the industrial physician, and by whole-hearted and close cooperation with him on the part of employer and employee.

THE first year after the war should bring many interesting changes in industrial hygiene. A number of hazards that have been kept military secrets, such as those associated with atomic research, radar, etc., should come to the fore. Industrial development in plastics and electronics will provide medical investigators with an opportunity to see many more cases of occupational poisoning. Some of the less tangible benefits of industrial hygiene will prove themselves to be more important as labor and management arbitrate grievances arising out of health conditions in industry.

—From "Medical Progress: Industrial Hygiene" by IRVING R. TABERSHAW, M.D., Birmingham, Alabama, in *New England Journal of Medicine*, 233:15, 487-443, October 11, 1945.

Regional Industrial Hygiene Conference

—Abstracts of Papers given at the Five-State Meeting, Philadelphia, September 25-26, 1945—

Reported by
C. O. SAPPINGTON, M.D., Dr.P.H.

REPLETE with a variety of subjects, including consideration of both new and old problems of industrial hygiene, the Five-State Regional Governmental Industrial Hygiene Conference was held at the Benjamin Franklin Hotel, Philadelphia, September 25-26, 1945. This conference was sponsored locally by the Bureau of Industrial Hygiene of the Pennsylvania Department of Health, and the cooperating agencies were the Division of Industrial Hygiene, U. S. Public Health Service; the Division of Industrial Health, Maryland Department of Health; Bureau of Occupational Diseases, Baltimore City Health Department; Bureau of Industrial Hygiene, New Jersey Department of Health; Division of Industrial Hygiene, New York Department of Labor; Office of Industrial Health, Long Island City Health Center; and Bureau of Industrial Hygiene, West Virginia Department of Health.

DR. JOSEPH SHILEN, Director, Bureau of Industrial Hygiene, Pennsylvania Department of Health, presided at the opening meeting and welcomed the audience, introducing DR. HARRY W. WEEST, Secretary of Health, Commonwealth of Pennsylvania, and DR. RUFUS S. REEVES, Director of Public Health, City of Philadelphia.

DR. WEEST said, in part, that industrial hygiene should be considered a great forward step, that it has aided materially during the war both for workers and production. Cooperation by management has been noteworthy. Industrial hygiene practices have been found economically sound in peacetime. There is afforded a protection of the earnings of workers—compensation is not comparable, but industrial hygiene practices lower it. This conference should result in much valuable material.

DR. REEVES stated that industrial hygiene and industrial medicine have won an important place for themselves. The health of the worker is paramount in industry. Much data have been prepared, but, as said by one of the radio characters, this is only the beginning. Medicine, management and labor, as a team, can accomplish great things. This conference has scheduled a very elaborate lineup of talent.

DR. T. LYLE HAZLETT, Medical Director, Westinghouse Electric Corporation, and Professor of Industrial Hygiene, the University of Pittsburgh Medical School, presided at the morning session, stating that a debt of gratitude was owed those who so skillfully arranged the program for the meeting. Many advances have been made in the field of industrial hygiene, but there were numerous restrictions for security reasons with respect to making these advances known during the period of the war. Greater advances will be made in peace time in the future through the cooperation of labor and industry.

Morning Session

MR. FRANK J. WILLARD, in presenting the subject "Radium Dial Painting Control Methods," said that there has been an enormous increase in the use of radium painting and that the screen method has come into increasing prominence, supplementing hand work. The screen method was briefly described, showing that cut-out figures and a squeegee are used in the process, immersing the equipment in a shallow pan, thus coating the places where the cut-out figures allow such coating.

The industry will become stabilized through the use of modern methods, and operations have been greatly improved. An investigation in 1942 showed that, at the beginning of the work in a plant which had just opened, the methods seemed satisfactory, but six months later breath analyses showed high figures of radon gas. Two methods of measuring the amount of radon gas in the exhaled breath were briefly described: In the first, the breath is exhaled into a flask of nitrogen, the breath displaces the nitrogen, and later the contents of the flask are analyzed. The second method involves the exhalation of breath into rubber balloons and analysis by the methods of the U. S. Bureau of Standards. Samples were taken before work in the morning, using the standard of 1 microcurie per liter. It was found that there had been a 200% increase in workroom air in this plant and the plant was, therefore, closed, although no excessive amount had been absorbed by the workers up to that time. Ventilating measurements were also made. Excess amounts of material were found on the walls and floor, and it was discovered that the mixing operation was the main source of contamination. The walls and floors were thoroughly cleaned with a vacuum cleaner and washed with soap and water.

Lantern slides showed magnesite floors with rounded edges wherever possible. Plastic walls were covered with enamel paint. The mixing operation was put in a separate room. There were hooded tables, on which were special ultra-violet lights. Each table top was composed of linoleum with a hard smooth finish. A minimum velocity of 100 feet per minute of air was maintained for ventilation. Entrance to the drying chambers was accessible only after turning on the ventilation, making use of a red signal

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Introductory

PRESIDING, DR. JOSEPH SHILEN, Director, Bureau of Industrial Hygiene, Pennsylvania Department of Health.

DR. HARRY W. WEEST, Secretary of Health, Commonwealth of Pennsylvania.

DR. RUFUS S. REEVES, Director of Public Health, City of Philadelphia.

September 25

CHAIRMAN, DR. T. LYLE HAZLETT, Medical Director, Westinghouse Electric Corporation; Professor of Industrial Hygiene, University of Pittsburgh Medical School.

Radium Dial Painting Control Methods—MR. FRANK J. WILLARD, JR., Industrial Hygiene Engineer, Bureau of Industrial Hygiene, Pennsylvania Department of Health.

Are Dust Counts Made by Different Laboratories Comparable—MR. PAUL D. HALLEY, Industrial Hygiene Engineer, Bureau of Industrial Hygiene, West Virginia Department of Health.

Engineering Control Methods—MR. E. C. BARNES, Industrial Hygiene Engineer, Westinghouse Electric Corporation, Pittsburgh.

Prevention of Oral Diseases of Occupational Origin—DR. LYMAN D. HEACOCK, Senior Dental Surgeon (R), Chief, Dental Unit, Division of Industrial Hygiene, U. S. Public Health Service.

Medicolegal Aspects of Occupational Diseases—HON. DANIEL G. MURPHY, Chairman, Workmen's Compensation Board, Pennsylvania Department of Labor and Industry.

CHAIRMAN, DR. W. F. REINDOLLAR, Director, Division of Industrial Hygiene, Maryland Department of Health.

Prevention of Industrial Dermatoses—DR. LOUIS SCHWARTZ, Medical Director, Chief, Dermatoses Section, USPHS.

Illness in Industry—DR. CHARLES-FRANCIS LONG, Chairman, Industrial Hygiene Committee, Medical Society of the State of Pennsylvania; Medical Director, Bayuk Cigar Company, Philadelphia.

Industrial Nursing—MRS. MARION MANGENE, R.N., Past President, Member Board of Directors, Industrial Nursing Association of Philadelphia; Chief Nurse, Vogt & Son Packing Company, Philadelphia.

Dust Concentrations in Stone Crushing Operations—MR. A. C. STERN, (JACK BALIFF, A. E. PERINA), Division of Industrial Hygiene, New York Department of Labor.

Pennsylvania Bureau Activities—DR. JOSEPH SHILEN, Director, Bureau of Industrial Hygiene, Pennsylvania Department of Health.

Round Table Discussion—Presiding, DR. J. G. TOWNSEND, Medical Director, Chief, Division of Industrial Hygiene, USPHS.

September 26

CHAIRMAN, DR. W. S. MCELLROY, Dean, University of Pittsburgh Medical School. Industrial Health in Small Plants — DR. GLENN S. EVERTS, 1st Council District Member, Industrial Health and Hygiene Committee, Medical Society of the State of Pennsylvania, Philadelphia.

Medical Criteria in the Reconversion Program—DR. HARVEY BARTLE, Formerly Medical Director, Pennsylvania Railroad System, Philadelphia.

Integration of Industrial Health in the Public Health Program—MR. J. J. BLOOMFIELD, Senior Sanitary Engineer, Assistant Chief, Division of Industrial Hygiene, U. S. Public Health Service.

Value of Industrial Health to Management—DR. VICTOR HEISER, Consultant on Industrial Health, N.A.M., New York City.

Value of Industrial Health to Labor—MR. JAMES L. MCDEVITT, President, Pennsylvania Federation of Labor; MR. JOHN A. PHILLIPS, President, Pennsylvania Industrial Union Council.

CHAIRMAN, DR. W. E. DOYLE, Surgeon (R), Chief, Medical Unit, Division of Industrial Hygiene, U. S. Public Health Service.

Environmental Conditions in Plants Molding Lead Plastic Bullets—DR. L. A. KAGEN and MR. E. L. SCHALL, Bureau of Industrial Hygiene, New Jersey Department of Health.

Toxicity of Some of the Newer Plastics—DR. A. G. CRANCH, Industrial Toxicologist, Union Carbide and Carbon Corporation, New York City.

Mental Health in Industry—DR. C. C. BURLINGAME, Psychiatrist-in-Chief, The Institute of Living, The Neuro-Psychiatric Institute of the Hartford Retreat, Hartford, Connecticut.

Industrial Ophthalmology—DR. CHARLES F. KUTSCHER, Associate Professor of Ophthalmology, University of Pittsburgh Medical School; Ophthalmologist, Carnegie-Illinois Steel Corporation, Pittsburgh.

light. No lighting was allowed in the room except the light on the tables, by which the operators could see paint on the hands and thus remove it. Lantern slides also showed the washroom equipment, with an ultra-violet light for the inspection of the hands, and hot water, soap, solvents, brushes. The light was operated by a foot-pedal; the room was otherwise dark.

Inspections were carried on of the walls and tables and surfaces by a special light and removal of any material, if found.

Pre-employment examinations were done, and a preliminary training period was accomplished by the use of fluorescent paint, those exhibiting any carelessness not being permitted to continue at work. Periodic blood counts were taken, and breath analyses were made every six months, the later being relied upon as a criterion.

Slides were also exhibited showing tolerance tests by months and their improvement. Screens were cleaned by use of an oily rag which was later deposited in a special container.

It is believed that the previous hazards of this method can be minimized by the use of the present screen method.

MR. PAUL D. HALLEY discussed the subject "Are Dust Counts Made by Different Laboratories Comparable?" It is evident from experience that a standard process is needed for the counting of dust samples. Methods were published in 1932, 1937-38, and 1940 by the Committee on Standard Methods. Experience has shown that there is a variability of 200% with different methods.

Contact was made with 45 laboratories with reference to these comparisons and the points to be considered are as follows: (1) collecting medium; (2) illumination; (3) the period of elapsed time between the collection of the sample and the count; (4) type of cell used; (5) the use of a blank; (6) optimum concentration in the counting area; (7) method of counting; and (8) settling time.

With respect to the collecting medium, the practice is to use water, water and alcohol, or alcohol alone. Briefly, 39% use water alone, 10% ethyl alcohol, 10% isopropyl alcohol, 35% an alcohol-and-water mixture.

Forty-one laboratories use light field; one, dark field; and three, both.

Standards have prescribed that the time between the collection of the sample and the count should be under 36 hours for most dusts, and under 12 hours for dusts which tend to flocculate. In this investigation, the usual maximum was 36 hours and none went over 48. Most technicians agreed that samples collected in alcohol can be kept for several days, but all samples should be counted in the shortest time possible.

Regarding type of cell, 79% used the Sedgwick Rafter cell or the MSA type; 6% used the Hatch cell, and 15% used a 1/10 mm. cell.

Most technicians carried the blank into the field during the collection of the samples. Forty percent allowed a six particle count blank—28% allowed a 10 particle count blank, 12% allowing 15 to 20, and 20% stating no maximum count on the blank.

There was considerable difference of opinion with respect to the optimum concentration in the counting area; there were differences of maximum from 20 to 200 per ¼ square millimeter, 28% allowing 20 to 50; 47%, 50 to 100; and 25%, 100 to 250.

With respect to the method of counting, 63% counted only settled particles, 37% counted all particles.

The previous method of counting just alluded to and the next subject, settling time, probably accounted for most of the differences in results.

There were three schools of thought with reference to the settling time: (1) those who used a short but indefinite period of settling time, in which all of the particles settled on the bottom in one plane were counted; (2) those who used an exact settling period and also counted all of the particles on the bottom of the cell in one plane; and (3) those who used an equilibrium count, counting all particles settled at the bottom of the cell at varying periods of time which sometimes involved several hours. In this study of the 39 laboratories using cells with a depth of one millimeter, the following variations were obtained: one laboratory used exactly a five-minute settling period; one used approximately six minutes; one, approximately 10 minutes; one, 15 minutes exactly; 11, 20 minutes exactly; three, 30 minutes exactly; one, 60 minutes exactly; four used a minimum of 20 and a maximum of 30 minutes; two a minimum of 20 and a maximum of 40 minutes; one a minimum of 30 and a maximum of 60; six approximately 20 minutes, with a settling time not closely observed; four approximately 30 minutes, with a settling time not closely observed; and three showing a variation of 20 minutes to several hours.

Those laboratories using blood type of cells observed a settling time varying between one minute and 15 minutes. With reference to counting in different planes, 78% of the laboratories counted particles all settled in one plane on the bottom of the cell and 22% counted the particles throughout the suspension medium.

The best medium seems to be alcohol. Considerable variation of results is probably due to the great differences in settling time, varying 20, 30, 40, 50 and 60 minutes to a period of six hours.

In conclusion, the difficulties probably are due to the fact that we have one rigid standard classification; it is quite likely that some modifications would be needed for each group of dusts if the results are to be comparable.

MR. E. C. BARNES presented a discussion on "Engineering Control Methods."

Engineering control usually indicates specific methods, but the broad application of engineering principles is really involved. There is much to be done, even in small plants, and an enormous amount of work in large plants, which really adds up to the control of engineering.

Once in possession of the facts, methods of control are to be selected. There is great need for accuracy in the checking of apparatus and in the use of methods. An example of variable results in the estimation of trichlorethylene was mentioned: the results of two laboratories agreed that the concentrations in certain instances were between 350 and 400 parts per million, whereas one laboratory obtained results in the same environment under 100 parts per million.

In the company represented, information passes from the industrial hygiene department to the engineering department and supervisors and also in the opposite direction. A 4 x 6 material card is used on which the name of the substance, the supplier, the engineering character of the material, and other information is placed, as well as the location of use in the company. Any new material or any change in materials is referred to the laboratory before the card is issued to the engineers. In this way, if the use of a toxic material cannot be eliminated, a caution notice is issued on the card, expressed as a brief statement.

It is also to be emphasized that process specifications tell the engineers how to do a particular operation and these also pass through the industrial hygiene laboratory for comment. As an example of the supervision of processes of manufacturing, an aerosol insecticide was mentioned: a flow-sheet and layout were originally submitted by the engineers but this was changed entirely by the industrial hygiene laboratory because of the necessity of observing other precautions; the final layout was checked by sampling after it had been installed and was approved.

The rate of excretion of lead was used as a criterion of investigation of excessive air contamination in the experiences in this group. This appears to be better than blood studies or air sampling alone.

Finally, the hope was expressed that the problems of the past few years will not lead to hurried decisions—we should develop more accurate methods of control and also control engineering.

DR. LYMAN D. HEACOCK discussed "Prevention of Oral Diseases of Occupational Origin."

The development of industrial hygiene methods was first reviewed. Disease of occupational origin was recognized in the first century, and later on Ramazzini called

attention to this type of pathology. There are few books which give descriptions of oral pathology and most of these have been handed down from previous decades or centuries. There is great need for revision and more investigative work. The work of Schour and Sarnat was referred to, and especially the classification made by these investigators.

The changes that can take place are, briefly, abrasions, decalcification, caries, pigmentation, circulatory disturbances, neoplasms, and gingivitis; and the substances involved are dusts, acids, sugar, the halogens, ammonia, tar, pitch, mercury, lead, bromine, and radium.

The relative hardness of various substances is important in abrasion. Decalcification occurs from acids, the enamel being affected. Caries results from decalcification or organic damage. Fermentation of sugar may result in the production of acid. Pigmentation results from exposure to fluorides or from heavy metals. Various types of dyes or chromates may color the teeth—pigmented gingivae occur from exposure to heavy metals. Inflammation of the oral tissues may occur from mercury exposure and may come about before systemic damage. Chromium fumes are also important. Circulatory disturbances are common and may result from local disturbances of the blood or systemic disease—here the occupations of caisson workers and divers are important, and also exposure to benzol. Degeneration of tissue occurs in radium exposure, and neoplasms in tar and pitch exposures. The influence of actinic rays may also be responsible for chronic irritation, especially notable on the lips.

It is to be emphasized that the chemical, physical and bacteriological agents produce lesions which are really no different from other occupational disease sources.

Poor oral hygiene opens the opportunity for damage. The industrial dentist is concerned with the dental health of the worker. Oral pathology may be indicative of an occupational exposure, and dental services should be integrated with the medical services for this reason.

Important elements in the program are pre-placement examination and diagnosis, emergency treatment, treatment and eradication of sepsis, records and case-finding, health education and follow-up, and emphasis on the periodic examination which is necessary to check the effects of exposures.

It is important that the industrial dentist should have specific training and knowledge. Emergency treatment makes workers much more effective. Fractures need immediate attention. Pyorrhea is aggravated by some industrial exposures. Better efficiency has been noted in the elimination of sepsis and good general health is important.

Education for workers is very important, by various means—the worker should be shown the disease in his mouth by the aid of a mirror.

In conclusion, the industrial dentist stands ready to take part in the preventive program and improve the general health of the nation.

MR. THEODORE C. WATERS, in the absence of HON. DANIEL G. MURPHY, presented the subject "Medicolegal Aspects of Occupational Diseases."

The problems of human relations are of great importance to industry and the public. A simple method with respect to the use of compensation boards has evolved and has displaced the old negligence principles, where the worker was not prepared to employ counsel and go to considerable expense in the trying of his suit. In the compensation method, the employer gave up his common law defenses, the doctrines of assumption of risk, contributory negligence, and fellow-servant. In the present system, therefore, the employee can more easily recover a reasonable compensation without so much difficulty on the part of both employee and employer and without so much expense to each.

Workmen's compensation laws exist in all states except Mississippi, and within the last few years a considerable number have adopted occupational disease legislation. However some laws are very complex in their language—but experience will dictate what should be eliminated. The two greatest problems involved are determination of occupational disease and the determination of the extent of disability.

The creation of medical boards and advisers is a very important conception, and this is in effect in some states.

One of the difficulties is the fact that accidents are due to an element working at a specific time and at a specific place, which theory is not applicable so easily to occupational disease problems—hence the difficulty of statutes of limitation.

There are several types of laws, known as the schedule, the blanket, and those referring to certain industries.

It is acknowledged that there is great need for the obtaining of proper medical advice for the commission and the legal profession.

Another problem which has created considerable difficulty is accrued liability, particularly with reference to silicosis cases. And the diagnosis and establishment of disability are still problems of disagreement in cases with respect to silicosis.

Bureau services are now well established in a great many states and should be used constantly by industry.

It is incumbent upon the employer to provide a safe, clean, healthy place to work because it pays real dividends.

DR. W. F. REINDOLLAR, Director of the Division of Industrial Hygiene of the Maryland Department of Health, presided at the afternoon session.

DR. LOUIS SCHWARTZ discussed "Prevention of Industrial Dermatoses."

Industrial dermatoses are the most prevalent occupational disease, statistics showing that approximately two-thirds of the compensation cases occupy this category—but most cases of industrial dermatoses are not filed because they involve less than one week of disability and lose hours rather than days. It must be remembered, however, that such cases are crippling to production and to compensation.

The important points in the prevention of dermatoses are as follows: keep contact at a minimum; enclose processes; use exhaust and intake ventilation where needed; provide hoods over sources of dusts, gases, vapors, fumes; wet-clean daily the walls and floors of the establishment; keep equipment clean; use protective clothing; use protective ointments, which should be specific; supervise an adequate personal cleanliness program, which is perhaps the best procedure among the preventive measures; use proper principles of pre-employment selection; transfer those who have recurrent attacks.

Pre-employment patch testing probably is not as valuable as formerly supposed, as time is necessary for sensitization, unless it has taken place previously—nor does the patch test allow for hardening when done early. Medicolegally, it is possible to give an employee a dermatosis but not a job.

Protective clothing should actually protect the individual; the main objection seemingly is that it must be kept clean and should be durable and kept in repair. Many absurd objections are made to wearing gloves, but surgeons wear them in very delicate operations. Sweating is the real objection; however, one can get two pairs and change them, the other pair being rinsed and cleaned and drying while one is being worn. By reasoning with union leaders, no difficulty has been met which could not be surmounted. Gloves can also be gotten in materials other than rubber, and they should be snug at the wrists. An impervious apron can be worn to protect the front of the body; plastics are used in the manufacture of this type of protective clothing.

Six types of protective ointments were considered: (1) vanishing cream type, which facilitates the removal of dirt at the end of the day and makes for efficient washing; (2) "invisible glove" type, which prevents irritant contact—there are two of these, the water-soluble for fat solvents (example, methyl cellulose) and the water-insoluble for water-soluble irritants (example, shellac); (3) an ointment which fills the pores with an innocuous fat, which prevents the entrance of the irritant, such a compound acts as a buffer for fat solvents (example, lanolin); (4) detoxifying type (may include any of the

above) with an antidote for chemical irritants (example, acids and alkalies); (5) type-4 invisible glove, with detoxifying chemicals; (6) one which contains a light screen which protects against actinic rays, (example, methyl salicylate. Zinc oxide prevents both tanning and burning).

A formula for a protective ointment against poison ivy was considered in detail.

A protective ointment should (1) be non-irritating; (2) give actual protection; (3) be easily applied; (4) be difficult to rub off; and (5) be easily removable with soap and water. No manufacturer has yet devised an apparatus to measure protection, but the U.S.P.H.S. has devised such an instrument which will later be described and a paper published. This device will tell how long an ointment will protect the skin.

As to the theories of the action of soaps, the following is stated: (1) emulsification of oils; (2) liberation of alkalies in the dissolving of grease; (3) lowering of surface tension, wetting and loosening soil; (4) acting as lubricant and permitting soil to be rubbed off; and (5) hydrolysis.

In conclusion, a proper skin cleanser should be chosen which will be suitable both for the job and the skin.

DR. CHARLES-FRANCIS LONG discussed "Illness in Industry," especially with reference to non-occupational illness.

It is certainly the art of clinical judgment to be able to say who should be sent home. Such questions may be asked as: What is the illness load? How can illness be prevented? If the present rate prevails, over six million workers will lose over eight days per person this year. In other words, 12% of the force will be absent during a week.

The rates for illness during the first quarter of 1945 show that the rates for the non-digestive and non-respiratory diseases are the highest in many years. There was also a relative increase in digestive diseases. It is conceded that the average male loses 11 days per year and the average female 13 days per year, in industry, and that the respiratory diseases are mainly responsible.

It is important that a searching physical examination continue to be used in industry, but 92% of the establishments are small and usually have no service.

Respiratory and digestive high rates are the most important; if these could be controlled, 50% of absenteeism could be cut down. Air-borne bacteria may be killed by ultra-violet rays or by triethylene glycol vapors. Prevention of digestive diseases is mainly a matter of diet and discipline and not an easy task, but constant education will slowly prevail. The eradication of tuberculosis is important, and the x-ray program of chest radiography is important here. Also there should be a constant re-check of the minimal and arrested cases.

Sick people may be divided into several classes: those who lose time inevitably; those in which the loss might be avoidable; and those in which it is actually avoidable. In the first class, the acute contagious diseases are largely responsible, whereas in the second class, the mild respiratory, digestive, and menstrual effects are important. In the third class, we have all manner of chronic difficulties which may be avoidable, even to heart cases with auricular fibrillation, which as examples, were described.

Preventive programs have been the means of discovering greater working ability in the older people, in the cardiovascular types, and others, through the cooperation of management, medicine, and labor. This is accomplished by frequent periodic examinations and advice.

In conclusion, non-occupational illness is costly—the cooperation of the employer and the employee with physicians can do much to remedy the situation.

MARION MANGENE, R.N., presented a paper on "Industrial Nursing."

The industrial nurse must have great versatility to be successful. Management usually must be convinced as to the value of a dispensary. The need for medical supervision was realized early and is one of the principal problems. Out of this need evolved industrial nursing meetings and the formation of associations and geographical groups, the speaker giving a general review of the progress of these groups.

Contentment must accompany the service, the nurse must keep well and give health instruction. The industrial nurse is judged by her industrial patients; she has discovered that most of her patients are ambulatory, and nursing in industry is a specialized form of service. To get deference, one must show deference, and be a good listener on all problems.

It is important to know that everything done or said should be recorded and that, after all, the nurse is only a nurse.

The industrial nurse is a real help in convincing the worker that rules and regulations are necessary to safe and healthful existence. Cooperation with foremen is undoubtedly an important part of the program. There should be active participation by the nurse in safety committee activities. The nurse, it should be emphasized, acts more often as intermediary than the doctor.

Finally industrial nursing is more than nursing—it is really quite specialized; locally and nationally it is a real contribution to the success of the industrial health serivce.

MR. A. C. STERN discussed "Dust Concentrations in Stone Crushing Operations" referring at the beginning of his talk to the rock-drilling code of New York State.

In this survey, there were 218 quarries included in the study made in 1939-40. About 60% of these showed less than 10% free silica in the rock determinations (reference being made here to the provisions of the rock-drilling code in New York State).

Samples taken in the crusher were obtained by following the men around with a portable apparatus. Many crushers are located almost in the open or actually in the open. Most crushers have screening operations and are associated with sand and gravel products. Most screening operations are wet processes.

The next largest group in this survey after the crushing operations was in the making of road ballast rock.

Some operations in the various companies were enclosed and man-operated while others were enclosed and not man-operated.

Most processes included primary and secondary crushers and screening. Figures were obtained in plants only without engineering control.

Over a two-year period, triple counts were taken; about one-half of the counts in the crushers were under 300 million particles per cubic foot of air. In the screening operations, about one-half of the samples were under 100 million particles per cubic foot of air. Most of the other samples were not significant. All of the samples obtained showing counts over 1000 million, were found in the crushing operations.

It was established in this survey that there was good control of dust in metal mines, but not so good in talc mills. In the talc operations, half of the counts were under 200 millions per cubic foot of air. Talc counts ranged in some instances from 1000 to 7000 millions, but these were not all man exposures. Altogether, 183 counts were made, which means, in this series, 61 sets of three counts. The maximum percent deviation from the average was 13.8% and the table shows three categories: 0 to 100 (14); 100 to 300 (40); over 300 (27). The speaker interpreted this to mean that counts under 100 millions necessitated triplicate counts, but if they were over 300 there was no need for a triplicate count; duplicate counts should be done in the medium range.

DR. JOSEPH SHILEN presented a brief report on "Pennsylvania Bureau Activities."

The health activities of the community must keep pace with plant health activities, realizing that the deleterious effects of non-occupational diseases are the chief drain. The private practitioner is responsible for non-occupational diseases whereas the industrial hygienist, the industrial physician and employer are responsible for occupational diseases.

Services of the Bureau include diagnosis and advice on

occupational diseases; administrative programs for various plants; dental services; quantitative determinations of air contamination; air velocity and ventilation determinations and advice; mechanical and engineering control advice, and a report with recommendations. Reports are edited at Harrisburg and the text is confidential. The individual who has requested the investigation receives a copy and the management receives the original of the report.

The records of the Bureau show that there were over 7000 visits in 1944. Only 8% of the plants involving 47% of the workers had a medical program, whereas 92% involving 53% of the workers had none.

The medical profession should assume leadership in adequate medical programs to reduce lost time and should arrange cooperative facilities with various community agencies.

Morning Session

DR. W. S. MCELLROY, Dean, University of Pittsburgh Medical School, presided.

DR. GLENN S. EVERTS presented a paper on "Industrial Health in Small Plants."

Example was given of a small plant medical service in a group of 500 in which there were less than eight lost time accidents in a period of a year. This group employed a full-time nurse and a part-time physician, the reason given by the industrialist being that the service was a morale builder, and offered better working conditions and other opportunities to keep and get better employees in the reconversion competition period.

There are many different types of agencies cooperating and educating various groups of people to the end that small plants become interested in having a health service.

A special plea was made to private practitioners in various communities to extend their practices into industrial health work.

The experience of the speaker had been with 29 small plants with dispensaries and part-time physicians, with the result that much time was saved to the workers. It seems desirable to get a nearby private practitioner and have a full-time industrial physician supervise the entire group of plants.

One of the first considerations is that the private practitioner will want to know three things: (1) How much time will it take, and what hours are to be devoted? (2) What fee will be paid? (3) What is the nature and scope of the service? The answer to question No. 1 obviously depends on what management wants—at first, this will probably be only accident care. One can say that one hour per week per 100 workers is the minimum amount of time, but it is preferable to devote two hours per week per 100 workers as a start. Afternoon hours seem better for the care of accidents.

The answer to question No. 2, as to what fee should be paid, remains largely with the individual physician and varies with the community. A personal interview with the plant manager should be obtained and it is a cardinal rule that management must expect to pay an adequate fee.

The answer to question No. 3, with respect to the nature and scope of the service, depends upon the character of the work of the industry, realizing that one hour per week per 100 workers hardly more than cares for accidents and allows time to guide the nurse. Eventually more time will be needed and two hours have proved optimal. Gradually more care will be extended with the use of examinations, directing the treatment of minor illnesses, referral to private practitioners, safety activities, and occupational disease control.

The average daily routine of activities presents an interesting kaleidoscopic job, some of the activities being as follows: consideration of a compensation case; phone calls, answering inquiries; prognosis on a serious injury; executive interview; consideration of the "go homes"; advice on family sickness; assisting in the safety program; giving advice to the plant engineer; talking with representatives of the insurance company; investigating processes with reference to occupational disease exposures; the ordering of a hose mask; dermatosis case referral; advice on placement.

This whole field represents a real challenge to the private practitioner who gives part of his time to industry.

DR. HARVEY BARTLE discussed "Medical Criteria in the Reconversion Program."

There has been great use of technical improvements during the war period in an effort to maintain health on the highest levels, protecting the workers against hazards. Examinations are not a barrier to work, but are really protective measures. A health service provides an opportunity for sub-standard workers to obtain jobs, properly placed.

With the development of health programs during the past decades, there has come a need for clarification of procedures. It should be definitely kept in mind that non-medical and medical procedures are distinct and separate activities. In some organizations there is a coating of medical veneer with reference to the medical and health programs, associated with pecuniary interests, but the medical department is finally responsible for all medical problems.

Medical and health services in industry are necessary to social progress; the health service being predominantly medical, however, should not be an impediment to free thought. The physician-patient relationship should be preserved and the service should be personalized, not mechanical and mass production in type. Health is important both to the worker and to industry.

Scientific appraisal and adaptation are really necessary to success in the development of ideas, and all rational methods, both preventive and remedial, should meet with whatever adjustments are necessary for practical use.

Physicians should possess sufficient qualifications and there is really a dearth of qualified men. Friendship alone is not sufficient to establish adequacy of qualifications.

Refresher courses make for progress, and fellowships should be established by industry. Among the qualifications necessary for the physician should be experience, competency, and the right attitude; moral responsibility to the management, medically, economically, and ethically; cooperation with the worker and the community; a flexible personality; and also the necessity for the receiving of sufficient remuneration.

Careful health examinations should be made by qualified examiners and with proper facilities, and there should be a standard pattern outline with specific appraisals, intimately associated with job analyses. The examination might be comparable to the armed forces examination, and approved both by management and labor. It is a significant fact that returnees will not be satisfied with mediocre service.

Rehabilitation must make use of the best measures for raising substandard workers to a point where they can be adapted to service, focusing attention on human personality (the word "handicap" should not be used, but "substandard workers" instead). There is definite need for coordination, unifying the various agencies who have participated in emotional display, enthusiasm, grandiose schemes and those who do have common sense urges.

Medical care plans need critical investigation with the exercise of care and judgment in appraisal—industrial management participation should be ethical and approved by medical authorities. It should be emphasized that emergency care is of the greatest importance to the worker.

Finally, it should be remembered that the criteria of today may be obsolete tomorrow.

MR. J. J. BLOOMFIELD discussed "Integration of Industrial Health in the Public Health Program."

It was realized early that the health of the community is vital to the industrial health program (example was given citing an epidemic of dysentery in a western shipyard in which 800 of the 8000 employees were affected and in which both industrial and community facilities were coordinated).

We must have the concept of total man for the efficiency of the industrial health program and integration of indus

trial health in the total health program. Use should be made of all avenues to reach these objectives, families, schools, investigation of special types of diseases, etc. Moreover, it is necessary to know what other agencies are doing, even if a great deal of time must be spent in acquiring this information.

Total health programs for workers should result in cooperation between medical and community agencies, the custom of inviting private practitioners to plants for visits and meetings being a recent example of such coordination.

The extension of industrial health to adult health has been encouraged by Federal and state groups.

Timing is important in the integration of industrial health and community health, and the staffs of the Federal and state groups are qualified to proceed with the education of management because of understanding and previous contacts. It is, therefore, of the greatest importance that the industrial hygienist keep well informed as to the progress of health work.

Some of the important elements are as follows: (1) a safe and healthy working place and environment; (2) medical and nursing service in a medical dispensary provided by industry with the inclusion of examinations, hygiene services, the use of dentists, and educational programs; (3) feeding facilities; (4) welfare services, such as benefits, insurance, recreation and the like.

Small industries are obviously more dependent on community agencies, and governmental groups engaged in industrial hygiene can supply advisory services on the above elements to the small industrial groups, as well as the large.

Non-occupational disease should be attacked both in the factory and in the community in a coordinated fashion. Examples of this have been the tuberculosis control program, in which 750,000 persons have had chest x-rays made during the past two years. Also, there is the nutrition program which had its exemplification in the control of food-poisoning outbreaks. It has been ascertained that about 43% of industrial groups furnish meals for the employees. Venereal disease control programs are another example which now is recognized by management and labor as being an important undertaking. Industrial dentistry is another phase, and there have been recent regional conferences on this subject. As a last example, there are the neuropsychiatric activities in the classification of personalities and the prolongation of mental health.

Education is the most neglected element in this whole field—courses in industrial health should be given in high schools, colleges, and other non-professional schools, although the professional schools should not be left out and need a great deal more of this type of work.

Industrial hygiene will undoubtedly expand dependent upon worker cooperation, but health representatives should be in the vanguard and lead. Support of both management and labor can be obtained through making information available.

Teamwork is a reality which has been accelerated by the war, and it must not be overlooked in reconversion—there should be coordination for integration.

DR. VICTOR HEISER discussed "Value of Industrial Health to Management."

A recent definition of industrial hygiene states that it is the science of the preservation of the health of the working population, primarily for the prevention of occupational disease and secondarily for the promotion of industrial health and hygiene, including environmental appraisals.

Why not say that industrial hygiene is the means of keeping personnel and the plant fit and for a profit? Profit motive should not be berated, because we are all actuated by it. The only way to go fishing part of the time is to make a profit most of the time.

We are going to enter a very keenly competitive era. There will be lots of products and there will be low prices. The biggest cost item is wages—good health increases efficiency and promotes a minimum of lost time for maximum production.

As an example, in a group of 500 employees, preventive measures were applied particularly with reference to the elements causing absenteeism and wage loss. One such group found, after experiencing a great deal of spoilage, that 20% of its employees had eye defects. When proper corrections were made, absenteeism decreased materially. Andrew Fletcher has stated that in his organization industrial health work is worth while from a dollars and cents angle, as well as the human relationships angle. Representatives of the General Electric Company have stated that industrial health work is one of the best investments and pays handsome profits. In the survey made by the National Association of Manufacturers of 1625 plants, only five didn't find that industrial health was a paying proposition and when these five were subjected to scrutiny, in reality only one gave a negative answer.

Also, the favorable results which accrue besides cutting down absenteeism and reducing compensation, show there is an improvement in the worker-management relationship and an improvement in production.

It is noteworthy that the American College of Surgeons have up to date approved approximately 60% of 1900 establishments with regard to their medical service. It is also significant that about 60% of the establishments in the country are small and have no such service.

A "share the doctor" plan is now in effect among Long Island industries for small plants in which service costs approximately $7.50 per worker per year, compared with the New Haven figure of $6.40.

The National Association of Manufacturers has the advantage of an experience with 14,000 members providing a great background for the gathering of experiences and statistics.

Finally, it is very significant that the interest of this conference shows that progress has and is going to continue to be made in this field.

MR. JAMES L. MCDEVITT, gave a very brief statement with respect to "Value of Industrial Health to Labor." Attention was drawn particularly to the appalling accident record during the war period and the fact that something should be done about it instead of merely quoting statistics. It is recommended that all complaints should be considered and passed on to the Industrial Hygiene Divisions in the various states.

Budget allocations in these divisions need consideration, and there should be no reduction in this or other states for this work.

MR. JOHN A. PHILLIPS completed the discussion of "Value of Industrial Health to Labor."

Labor has long been interested in healthful working conditions and realizes that good health and healthful surroundings are necessary to attain a normal span of life. Management, however, must be convinced of the value of industrial health services.

Labor is also concerned in the present health program in industry, but has certain other desires and objectives.

Labor believes that when substances are declared poisons the rest of the program is exerted through engineering control and should be in the labor department. Experience shows that employers have been obligated to provide safe and healthful working places under the existing labor laws. If authority is vested in the health departments, there is less liable to be enforcement in accordance with such laws.

Allusion was made to an editorial statement in the February, 1945, issue of INDUSTRIAL MEDICINE with respect to vesting the authority in the health departments rather than in labor groups. The labor people do not agree with this statement. It should be emphasized that the welfare of the workers is the primary concern.

Allusion was also made to a statement made in "Industrial Hygiene" (a publication) with respect to having psychiatrists attached to the state health departmens. A representative of the U. S. Public Health Service advocates emphasis on the psychiatric phase of all industrial examinations—to this labor is opposed because it is believed that it would not accomplish its purpose.

Finally, labor is vitally concerned with industrial health and is aware definitely of the contributions made by the medical profession, believing that such contributions and the industrial health program have a definite place. However, any state or Federal unit with reference to industrial hygiene and health work should be located in the department of labor.

Afternoon Session

DR. W. E. DOYLE, Chief, Medical Unit, Division of Industrial Hygiene, U. S. Public Health Service, presided.

MR. E. L. SCHALL discussed the industrial phases of "Environmental Conditions in Plants Molding Lead Plastic Bullets."

This study concerned the manufacture of a lead plastic bullet containing 50% lead and 50% plastic, used by the Army Air Force to indicate the accuracy of gunners. The lead is mixed with the plastic and the molten mixture is then pressed into bullets.

Lantern slides were shown of the molding machine, the press, inspection tables and belts. This study represented the first instance of pulverized material being molded with plastic.

In use, the bullet slugs go through plain plate, but merely leave a smudge on armor plate.

Simultaneous impinger and electrostatic precipitator samples were taken, the results being 5.9% lower in the former method. The dithizone method of analysis was used, which it is known is not masked by the presence of plastic.

The samples showed results ranging from 0.02 to 16.6 milligrams per cubic meter. Near the presses there was an excess exposure because of insufficient exhaust ventilation.

Those respirators which were worn were not of the approved type. The housekeeping was poor, also there was poor personal hygiene, and an attempt had been made to get control by rotation of employees.

Recommendations were made on the above findings with reference to exhaust ventilation, enclosure, personal cleanliness, and other factors. A complete medical survey was also advised.

Engineering surveys were also conducted in refinery plants where lead was processed, and there seemed to be good programs there. Tests in processes involving pulverized lead showed an excessive exposure, but there was a good respiratory protective program for intermittent exposures. However, exhaust systems were recommended for future protection.

DR. L. A. KAGEN discussed the medical phases of "Environmental Conditions in Plants Molding Lead Plastic Bullets."

The object of the medical phases of this study was to aid in the detection of hazardous evidence and to determine the extent of man exposure.

Examinations were made by two physicians and a laboratory technician, including history, examination, blood studies, and a clinical and quantitative urinalysis for lead; a spot sample of 100 cc. was used for the latter. Three persons per hour were examined, and the urine was collected under strict supervision. It was determined that molders, of which there were 32 of the 52 total examinations, had the greatest exposure—others had less. Twenty-nine of the 52 had gastro-intestinal or central nervous system symptoms; 23 had no symptoms. Of the physical signs, 17 showed tremor, seven pallor, abnormal reflexes 10, which were confined mainly to the central nervous system. Only two showed a lead line, probably because of predominating good oral hygiene.

Tabulation on a lantern slide showed the following findings for urinary lead in 50 samples (there being two normals):

	No.	Above 0.15 mg/l	Below 0.15 mg/l	Median	Range
Finishing	18	5	13	0.11 mg/l	0.002—0.25 mg/l
Molding	30	20	10	0.18 mg/l	0.059—0.73 mg/l

The red blood cell results showed five persons below 4 million count and hemoglobin showed five below 80. Stippled cells were seen in 13 individuals, of which 10 had previously shown excessive lead-in-urine concentrations.

Improvements were suggested in housekeeping, ventilation, and other means of protection.

In summary, 52 workers were examined, of whom 25 had excessive lead in the urine, the median values being abnormally high. It is to be kept in mind that these studies were made seven months after work had started in the plant.

DR. A. G. CRANCH discussed "Toxicity of Some of the Newer Plastics." This discussion was limited to certain compounds.

Manufacturing seldom presents trouble with respect to plastics because of control being instituted where necessary. For example, phenol-formalin-urea-melanin-methyl methacrylate where used are often processed in an enclosed system. The difficulty arises in processing plastics which are combined with other substances, some of which are hazardous. The outstanding difficulty appears to be dermatoses.

In some of the phenol-formaldehyde derivatives and compounds, when heated phenol vapor is evolved and ample ventilation of local exhaust type may be required.

Solvents are many, among which there are some 30 alcohols, some 50 amines, some 40 esters, some 20 ethers, some 25 variegated hydrocarbons, and some 12 ketones.

With regard to preventive measures, there appears to be slight if any systemic effect, and, as before mentioned, dermatitis is the main effect locally. Therefore, one should avoid undue exposure to vapors or skin contact. Ventilation of adequate local exhaust type and enclosure of process, reduction of unnecessary handling, cleanliness, protective clothing, protective creams, good attention to housekeeping, are all measures which will assist in the prevention of trouble. Denatured alcohol should be used for cleansing instead of other types of alcohol.

In summary, it may be stated that this problem does not greatly concern the basic synthetic resins, but relates especially to the toxicity of other materials compounded. The real problem is contact dermatoses, in which there appear to be relatively few susceptible persons. As stated previously, the preventive measures mentioned will assist in avoiding difficulty.

DR. C. C. BURLINGAME presented a discussion of "Mental Health in Industry."

This subject presents some problems for industry, but they are not really difficult nor are they many in number. It is to be remembered incidentally that approximately 83% of the so-called neuropsychiatric cases discharged from the services were never overseas.

It is believed that industry will not receive any greater number of neuropsychiatric persons than formerly, and, moreover, that the number of neuropsychiatric individuals has been no greater in the service than at home—but it should be added that we are not a nation of neuropsychiatrics.

With relation to the urge that returning veterans want to change their jobs, the facts are that 90% of people in peace-time desire to change their jobs at one time or another, so it is felt that this is a perfectly normal urge. Moreover, veterans are bound to feel different on returning home after unusual types of experiences, but such feelings are also found in those not in the services. It is quite probable that there is greater need to rehabilitate the war workers instead of the returning veterans.

One experience has indicated that there has been more trouble arising from 25% of regular employees than from a large group of re-employed veterans.

It is a significant fact that we have done a good job on the adjustment of men to their physical environment and with respect to their jobs, but nothing really progressive has been done with regard to emotional problems.

Finally, when you make the objectives of the employee the same as the objectives of the industry, then many problems will disappear.

DR. CHARLES F. KUTSCHER closed the sessions with a dissertation on "Industrial Ophthalmology."

The primary aim of industrial ophthalmology is to increase visual efficiency, production, and promote safety.

It is important to make a job analysis as to what kind of vision is needed, including various working distances, colors, speed of manipulation, and other similar factors.

For general use, Snellen test charts are used, but for specific uses other finer types of tests are found necessary.

Lantern slides of sand-blasting operations, spray painting operations, dust producing operations, and acid baths, were shown.

Certain heavy metals damage sight by ingestion, and, here, cleanliness goes a long way in preventing difficulty.

Radiant energy is a source of trouble at various times. Tabulations were given depicting the differences in the quality of radiant energy at various temperatures—for example, at 6000° F there is much red and visible light, but little ultraviolet light, which however is relatively important; at 3000° F there is no ultra-violet; at 2000° F there is little visible rays.

Lantern slides were shown of various types of eye injuries and eye grounds.

Where there is a history of accidental injury, it is very important to take the vision in both eyes. Constant checks should also be made in injury cases, because the results may be quite different from those of the original examination.

DR. PILGRIM

SOJOURNING into Ohio, reading enroute one of Earl Stanley Gardner's mystery stories, the same furnishing a needed relaxation, and, in the *Omnibook*, Samuel Hopkins Adams' estimate of A. Woolcott, wherein it was said: "He was that rare variety of virtuoso, a soloist on the bass drum." And browsing again in Jacques Barzun's "Teacher in America," which is commended to careful perusal by all who teach, write or read—the same including most of us, there being now a lesser number than before who can't read, albeit that too many who can, won't. . . . CONCERNED with working out administrative health practices in industry with MR. R. H. FERGUSON, and DRS. A. L. WATKINS, P. J. OCHSNER, ERNEST WOLFF, and D. M. MCDONALD, wherefrom it seems so many industries now have excellent diagnostic services, including the new-fashioned gadgets and procedures, from which great progress has been made, whereas so little while gone there was not much to work with in industrial medical establishments. . . . AND then a week of rest and relaxation of which was in great need, and sailing again with LLOYD T. BAILEY on *The Monsoon*, this time MADAM PILGRIM becoming overbalanced in the small dinghy by the wharf, thereby precipitating herself and the crewman "into the drink," wherefrom a change of clothes, the warm concern of friends, and resuming the cruise; and a week of sunning, swimming, and reading mystery tales, again essaying the game of "bowls" at which not so good, and enjoying with my consort the intricacies and complexities of "Dear Ruth," and traveling to a nearby farm, where surveyed the crops and animals, viewing the unusual sight of an ex-LaSalle Street "white-collar" girl milking the cow, and the week ending all too soon, whence the discovery that a week is a short interval in which to relax. . . . THEN with the Program Committee of the Chicago Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION with MESSRS. COOK, MALLETTE, DR. STEINBERG, and MISS MILDRED FREY, anent the final arrangements for the monthly meetings of the 1945-46 season. . . . AND a visit to a nearby industrial plant, the largest of its kind in the world, where conferring with DR. EDWARD DART on administrative practices in an industrial medical department, and journeying through the factory which is now shut down, and where, as in a ghost town, the long rows of mechanized equipment stand shrouded, in the great halls which reverberate our footfalls—weird contrast with the scene of feverish activity which helped to bring us world peace—or so we pray. . . . AND with the Program Committee of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, representatives of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, the GOVERNMENTAL INDUSTRIAL HYGIENISTS, the AMERICAN ASSOCIATION OF INDUSTRIAL NURSES, and the AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS, working out the plans for the 1946 Convention, and concerned with the schedule of the various organizations and the combined meetings of these. . . . AND then to beginning the 1945-46 season at rehearsal with the Chicago Business Men's Symphony Orchestra, and assured very fine soloist artists during the coming season, including a 13 year old pianist prodigy who will, at the first concert on November 26, perform the world premiere of the first piano concerto of Lionel Barrymore. . . . AND occupied with matters editorial and publication problems of numerous kinds, and consideration of new publications of divers forms and their opportunities; and in the evening to a friendly card party at DR. GLENN GARDINER'S, where was counting of spots and coins; and then, in general, checking on various plant studies, at work in the laboratory on many problems, and studying data on administrative measures in health departments in industry. . . . FOLLOWING, at several plants, where concerned with the examination of men, periodically and otherwise, especially in the interest of protection from certain types of exposure. . . . AND coming now the news that LT. COLONEL brother EMMETT, long overseas engaged in relief work in different foreign countries, is on his way back, from Washington, D. C., and scheduled to arrive soon. . . . WHENCE to the City of Brotherly Love, to the Five-State Industrial Hygiene Conference, the same being, indeed, a most informative one, with consideration of many subjects heretofore war secrets but can now be discussed in the open, and seeing Ernie Pyle's famous picture "G. I. Joe," which has a grimness that rocks one, but is fortunately punctuated with the humor so characteristic of American people wherever they go, or whatever they do; and visits to industrial plants, and renewing friendships, and conferring with R. D. TRAINER, L. B. F. RAYCROFT, DRS. K. A. KOERBER, and R. D. MAC KINNON, and JOHN MCMAHON, ELLIS W. BACON, W. C. L. HEMEON, and others. . . . AND celebrating the yearly natal day, among the good wishes of friends, and most concerned that now and evermore we have a world of peace. . . . AND to Wright Field at Dayton, where welcomed by LT. COL. H. N. PARRISH, MAJOR D. H. BYRAM, MAJOR J. M. STOCKTON, and MAJOR A. E. RAITT, and where were dinner conferences and visits to the industrial section, viewing with wonder the many things done on a strictly industrial basis in this branch of the air services; and later, through a most remarkable air show with LT. COL. PARRISH, seeing with much interest the greatest array of air materiel ever assembled. . . . AND to the Industrial Vision Institute at Purdue, renewing friendships and meeting many new people, and seeing much interest displayed, especially among nurses, in the elements of industrial vision. . . . AND preparing for other journeys, of which in later notes.

Glory

IT HAS been a long step from the primitive industrial first-aid station to the present-day concept of a medical department in industry. The path of progress has been steep and the obstacles many. Industry has been reluctant, over the years, in subscribing to the necessity for an adequate medical service. The medical profession, too, has been sluggish in recognizing the highly-specialized character of industrial practice and in affording it the rank it deserves. We may feel, however, that there can be no question concerning the value of the industrial medical department in the war effort, not only to the worker in industry, but to industry itself, to the maintenance of the production schedule, and to the reflected glory of the medical profession. Perhaps this should be glory enough.

—N. K. FORSTER, Editorially, in Industrial Health Number, *J. Indiana State M. A.*, October, 1945.

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Volume 14 NOVEMBER, 1945 Number 11

1946 Conference on Industrial Health

THE five professional organizations which are actively engaged in industrial health activities will hold their ANNUAL CONFERENCE ON INDUSTRIAL HEALTH at Chicago, April 8-13, 1946. These associations are (1) AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS (Thirty-first Annual Meeting); (2) AMERICAN ASSOCIATION OF INDUSTRIAL NURSES (Fourth Annual Meeting; (3) AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (Seventh Annual Meeting); (4) NATIONAL CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (Eighth Annual Meeting); (5) AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS (Third Annual Meeting). The headquarters of the Conference will be at the Hotel Sherman.

"Occupational Medicine"

THE foregoing is the name of the new magazine to be published by the American Medical Association, replacing *War Medicine*, which will be discontinued with the issue for December, 1945.* As publishers of INDUSTRIAL MEDICINE, the pioneer journal in the field of industrial health, we welcome this new periodical and extend to it and its editors and publishers the sincere offer of whatever cooperation we can give. It is a long time since the day in June, 1932, when DR. C. O. SAPPINGTON met with the small group who were then planning the establishment of INDUSTRIAL MEDICINE, the first issue of which appeared in October, 1932. Measured in years, the 13 of them which have gone by have witnessed the most significant world events of all time. Measured in terms of the progress of industrial medicine, the field has grown in scope and importance, and in necessity and effectiveness, to the point where, in the words of one of its career men, it has become "the biggest thing in medicine." There is the need, therefore, for another journal; the full coverage of industrial-medical subject matter which will find the widest usefulness among the increasing number of practitioners in this field is too much for one publication. The inauguration of *Occupational Medicine* by the American Medical Association will fill this need—and will do it better than it could be done by any other agency; it is the logical follow-up of the establishment of the Council on Industrial Health in 1937, and constitutes the final accolade of official recognition by organized medicine. The A. M. A., through its Council on Industrial Health, has undertaken to acquaint private practitioners throughout the country with the importance of the industrial background of the people they serve. The new journal can carry this message directly and forcibly to them. It has the opportunity to impress upon *every* physician, in his contacts with patients, the transcendent importance of Ramazzini's first question, "Of what trade is he?" The personnel of its leadership augurs well for accomplishing just that, as well as the numerous other things in the development of the field which only the A. M. A. can accomplish. Welcome, therefore, to *Occupational Medicine*. And "good luck to both of us!"

*As announced in *J.A.M.A.*, November 17, 1945.

Debut in Public Relations

DR. CAREY P. MCCORD'S newest book, just now off the press, has the intriguing title, "A Blind Hog's Acorns." Any book by DR. MCCORD is an event in industrial medicine, but the publication of this one is a very unusual event. In the first place, this volume is not a text or treatise, nor is it even medical. Instead, it is a story-book. With the sub-title, "Vignettes of the Maladies of Workers," it is the true story of DR. MCCORD'S adventures in industrial medicine — the "attenuated autobiography" of his first 25 years in the practice of industrial medicine and hygiene. Only rarely can an author—especially such a prolific author as this one—who is distinguished for his medical, technical, and scientific articles, write appealingly to the general reading public. This, however, DR. MCCORD has done. "A Blind Hog's Acorns," his first book in popular vein, discloses a charming and individualistic narrative style, with interest as gripping and sustained as that of a novel. The principal significance of this book, however, lies in the fact that it is the first book which will introduce industrial medicine and hygiene to general readers in the manner calculated to make them "industrial-medicine conscious." No one can read the episodes without a deep and permanent sense of the importance of the health of the worker from every standpoint, as well as of the scope and importance of the effective interest which employers are giving it. This is the book which, in the words of one reviewer, "every industrial physician would like to have written." Inside the field of industrial health and hygiene, this is the long-needed and convincing narration which everybody who reads it will want to present to that particular somebody else whom he has been trying to persuade toward the advantages of industrial medicine and hygiene—in other words, to the president, the vice-president, or the general manager of the company. Outside the field, on the broader basis of general public interest, this book is industrial medicine's first "public relations ambassador."

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The Doctors Have a Word For It

MERRYLE S. RUKEYSER, in his column, "About Money," commented the other day: "A wise and humane financier, who sits on the board of directors of many corporations, has derived from his experience certain convictions. He discussed them with me with the utmost candor in an off-the-record conversation. From the discussion emerged the subjoined simple rules for the guidance of management in dealing with workers: First, labor relations should be the concern of the top executives, and should not be delegated to clerks called personnel directors. The clerks have a bias in that, in order to safeguard their own positions, they have a tendency to report to management that all is well. . . ." To this we would add that, likewise, the equally-important *medical* relations should be the concern of the top executives and should not be delegated to "clerks called personnel directors." If these relations are "delegated" at all, the sum total of that delegation belongs to the medical director, and never to the personnel director or any other of the minor executive staff. In a great many instances, mostly among the best, the medical relations have been for a long time the concern of top management. In some of these the personnel director is himself a part of top management. But there are vastly too many situations where there is interposed between the medical department and the responsible executives such other so-called direction as affords the opportunity for what Mr. Rukeyser terms "bias." In point is the recent article in a safety journal describing the scope and importance of the safety department and, of course, glorifying the safety director. In the description of certain emergency measures in case of accident, it was stated that the nurse promptly calls the doctor "who immediately calls the safety director." The article doesn't say *what* the doctor calls him—but we can guess.

LETTER to the EDITOR

TO THE EDITOR: In the June issue of INDUSTRIAL MEDICINE (14:6, 500, 1945), DR. LOUIS SCHWARTZ and his collaborators published an article on the Skin Hazards in the Manufacture and Use of Cashew Nut Shell Liquid-Formaldehyde Resins. This article has an interesting background which, we believe, should be brought to the attention of your readers. The concern mentioned in the article has spent thousands of dollars during the past two years in a laudable attempt to solve the problem of dermatitis in relation to its products. For this purpose it engaged the services of several chemists and a physician with a special knowledge of the testing technics involved. This information, as well as the fact that the studies of this group were nearing completion, was imparted to DR. SCHWARTZ when he arrived at the office of this concern a few months ago. We are in agreement with the view that research should be open to every one interested, and we believe that progress is enhanced by cooperation among different investigators, Federal, industrial, private, etc. . . .

The work of DR. SCHWARTZ and collaborators is open to criticism. We propose here to mention only a few objections:

1. There is no evidence that the important principle of control was observed.

2. Too few observations were recorded to permit conclusions to be drawn, except in a most general way.

3. The use of undiluted raw cashew nut shell liquid in patch tests is an excellent method of sensitizing persons. For this reason among others, workers who handle this material, as well as products derived therefrom, should not have been subjected to such highly concentrated materials in patch tests. Knowledge of the nature of these materials would be enough to make one realize that dilutions should be used. It is not surprising, therefore, that SCHWARTZ and his co-workers found that undiluted raw cashew nut shell liquid caused primary irritation in all of their 15 subjects. Moreover, just as one cannot directly compare an apple with an orange, so results based on primary irritation cannot be compared with data based on hypersensitiveness, the *latter* being the essential problem in this industry. The same holds for anacardol used undiluted. Had DR. SCHWARTZ communicated with us, we would have been glad to suggest proper concentrations for testing.

4. There are many places where credit for prior work has not been given. For example, in their brief discussion of hydrourushiol in relation to poison ivy extract, DR. SCHWARTZ and his co-workers failed to note that KEIL, WASSERMAN and DAWSON had already established this relationship on the basis of extensive work published in the *Journal of Experimental Medicine* (80: 275, 1944).

5. That DR. SCHWARTZ and his collaborators failed "to establish consistent cross-sensitization phenomena between cashew nut shell liquid, anacardol and poison ivy" is not to be wondered at, since their reported data are wanting in systematized character. As a result of our studies involving more than 150 patients, we have found that persons sensitive to poison ivy are also sensitive to cardol in nearly all instances, and to the raw cashew nut shell liquid, anacardic acid, anacardol and "cardanol" in the majority of cases. Contrariwise, all patients showing a negative patch test to poison ivy gave a negative response to the cashew nut shell liquid and its components *when the latter were used in proper concentrations that were not primarily irritating.**

—HARRY KEIL,
DAVID WASSERMAN,
CHARLES R. DAWSON.

*KEIL, H., WASSERMAN, D., and DAWSON, C. R.: Science, 102:279, 1945; *Industrial Medicine*, page 779 this issue.

Definition

THIS ain't collective bargaining," the head of the union kept repeating. Instead of trying to dominate, the personnel director tried to understand. At last he felt sure Joe was motivated more by bewilderment than by cussedness. So he asked, "What is your definition of collective bargaining?" "A bargain is when you get something for nothing, and we ain't getting nothing for nothing." The personnel director could have said, "Don't be a damn fool." Instead he put his hands on his fanny. He paced up and down the floor, apparently in thought because he *was* deep in thought. How to set this situation right by kindness with no trace of weakness? Finally he said, "That's an interesting idea. I wonder what bargain really means. Let's get a dictionary." When he had finally found the word and pondered its definition, he said, "Come over here, Joe, and see if this means to you what it means to me." The above case is a good illustration of the difference between a solution arrived at cooperatively and one dictated by force of authority.

—From "The Personnel Director and His Postwar Job," by F. ALEXANDER MACOUN, Associate Professor of Human Relations, Massachusetts Institute of Technology, in *Personnel*, 22:2, 109-113, September, 1945.

A New Approach to Personnel Aptitude Analysis

DIAGNOSTIC PSYCHOLOGICAL TESTING

By **David Rapaport, M.D.,** Menninger Clinic, Topeka, Kansas.
With the collaboration of **Merton Gill, M.D.,** and **Roy Schafer, B.S.**

For the first time in a compact, convenient unit—the methods of application, a standardization and a psychological rationale of a *battery* of modern psychological tests.

A PRODUCT of the combined experience of clinical psychologists and psychiatrists at the Menninger Clinic, this two-volume work presents a wealth of new material and informative clarifications of major importance to all concerned with modern psychological testing. The seven psychological tests used are: (in Volume I) Wechsler-Bellevue Intelligence Scale; Babcock Test of Mental Efficiency; Sorting Test of Concept Formation; Hanfmann-Kasanin Test of Concept Formation; (in Volume II) Word Association Test; Rorschach Test; and Thematic Apperception Test. Emphasis is placed on the need for using a battery of psychological tests as one test is rarely sufficient for a full statement about any individual.

● ***Only the methods that have proved most effective are introduced,*** standardization of the techniques of analyzing these tests is offered, and new techniques of analysis of each test are explained. These books present a systematic treatment of selective impairment of the psychological functions underlying intelligence (scatter analysis) for the Bellevue Scale; an extensive treatment of the analysis of verbalization on the Rorschach Test; a new point of view and more sensitive scoring on the Sorting Test; a re-evaluation of the Word Association Test; etc. Thorough expositions of the psychological theory of each test generally, and of each test indication specifically, provide valuable aid in the interpretation of cases deviating from the expected pattern. Thus the psychology of the associative process, of memory, of concept formation, attention, concentration, anticipation, visual organization, affects, and so on, are treated.

● ***A practical and indispensable working aid,*** as well as challenging reading, ***Diagnostic Psychological Testing*** offers invaluable guidance to psychologists, psychiatrists, psychoanalysts and all workers in any field of applied psychology. Volume I will come from the press in November, and Volume II will be published in December. The price of the individual books is $6.50, postpaid; and the complete set is $12.00, postpaid. Mail the coupon for your examination copies *now*.

Details Every Essential of a Mass Chest Survey

MASS RADIOGRAPHY OF THE CHEST

By **Herman E. Hilleboe, M.D.,** Medical Director, Chief, Tuberculosis Control Division, U.S. Public Health Service; *and* **Russell H. Morgan, M.D.,** Surgeon (R), Medical Officer-in-Charge, Radiology Section.

". . . should be brought to the attention of radiologists, industrial physicians, employers, labor leaders, health officers, etc." — *Bull. Penn. Tuberculosis Society.*

NO ONE interested in tuberculosis and the health of industrial workers can afford to be without this authoritative handbook which discusses comprehensively every phase of early x-ray detection of tuberculosis in large population groups. Step-by-step, answering all questions by the way, the book takes the reader from (1) preliminary planning and (2) the selection of equipment to be used, through (3) all the practicalities of transporting, installing and operating equipment, (4) exposing and interpreting the films, (5) recording and filing of the data, and (6) the disposition of cases of disease discovered.

● ***The text outlines in detail the procedure for a mass-survey in an industry,*** including such practical points as: how one properly trained and equipped technician can perform 2,500 examinations a week; how 500-600 small films can be read by one physician in a day; how to "schedule the line" and cut the required time of each factory-employe to 15 minutes; how to deal with employes who decline the examination; 7 steps for efficient operation; interviewing employes with positive or suspicious findings, etc.

● ***Fascinating simplifications of technical matters*** are an outstanding feature of the work. The 6 basic needs of a photofluorographic installation are detailed, with full consideration being given to different types of x-ray transformer systems, tubes, the photofluorograph and 14 x 17-inch cassette holder, and so on. The authors present a new concept of effective unsharpness of x-ray images, and this vitally important part of the discussion culminates in a simple table of relative effective ability of 8 different kinds of film to record detail. ***288 pages. 93 illustrations (66 full-page plates). $3.50, postpaid.***

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Army Industrial Medical Program

—At a Port of Embarkation—

LIEUTENANT COLONEL JEAN S. FELTON,
Medical Corps, Army of the United States

THE Industrial Medical Program of the United States Army, as outlined in a recent War Department directive,[1] states that "As an employer, the Army is obligated to furnish safe and hygienic working conditions and to maintain an adequate industrial medical service for its civilian industrial employees." The execution of such a medical mission is accomplished by the Office of the Surgeon General through its Occupational Health Division, Preventive Medicine Service, where broad policies for the establishing of industrial medical services through Army operated arsenals, depots and industrial plants are established. This office renders a technical advice on all matters pertaining to medical service in industrial installations of the Army and supervises the direction and operation of the Army Industrial Hygiene Laboratory at Baltimore, Maryland.

Liaison with other government agencies immediately concerned with industrial health and safety is maintained by the Chief of this Division and responsibility for the carrying out of the functions of this program is invested in the Commanding Generals of the nine Service Commands, the Commanding General of the Army Air Forces and the Chief of Transportation. The several Ports of Embarkation operated by the Chief of Transportation (head of the Army's Transportation Corps) are deemed Army industrial plants, and as such, execute the Industrial Medical Program in a manner comparable to that seen in manufacturing, loading or storage installations of the Army's other technical services.

The basic requirements for a medical service for the civilian employees of the Army, as delineated by the Surgeon General, are:

1. Active utilization of the assistance of that office and of the Army Industrial Hygiene Laboratory as required.
2. Employment of such civilian medical, nursing, and technical personnel needed for the conduct of the program.
3. The designation of a qualified medical officer as Industrial Medical Officer at each of the Ports of Embarkation: this officer will, under the direction of the Port Surgeon, perform those functions inherent in the Industrial Medical Service.
4. Designation of a qualified Sanitary Corps officer as Industrial Hygiene Engineer where the services of such a specialist are deemed essential.

Objective

HENNESSY[2] has stated that the "objective of industrial hygiene may be summarized as the protection of health, improvement of efficiency and prolongation of life of industrial workers; in short, it covers the entire field of adult conservation." As the Army is by far the largest employer of civilian labor in the United States, every effort is being made by the War Department to maintain the health and productiveness of its civilian employees so that with physical fitness at a maximum and absenteeism at a minimum, the war effort may be promulgated to a successful conclusion.

The mission of a typical Port of Embarkation is to receive, process and ship all troops, impedimenta, and supplies assigned to or returning from overseas destinations. In addition, the Port operates and maintains all means of water, rail and highway transportation and other facilities assigned for that purpose and acts as a supply point for overseas forces.[3] To accomplish such a task, several thousand civilians are employed in all operating agencies of the Port. Responsible for the medical care of all military and civilian personnel of a large coast organization is the Port Surgeon, who exercises supervision over the Port medical installations, including ship hospitals. A section of the Office of the Port Surgeon, the Industrial Medical Branch, is immediately charged with the carrying out of the medical program for civilians, and the Port Industrial Medical Officer, under the Port Surgeon, insures that appropriate medical care is provided the War Department employees of the Port.

Functions

SPECIFIC duties are to be performed by the Industrial Medical Officer assigned to a port and these include:

1. The conducting of pre-placement physical examinations.
2. The conducting of periodic physical examinations.
3. The rendering of emergency care to employees injured in line of duty complying with the provisions of the United States Employees' Compensation Act.[4]
4. The providing of emergency medical care to employees who become ill or who present painful or distressing symptoms while at work.
5. The conducting of immunization programs.
6. The detection and control of occupational health hazards.
7. The prompt reporting, through command channels, to the Surgeon General of all severe or fatal cases of occupational disease occurring among industrial employees under his supervision.
8. The submitting of requests for industrial hygiene surveys as required.
9. The conducting of health programs among employees in cooperation with other administrative offices of the port installation.
10. The maintenance of an active cooperation with the safety program (Accident Prevention Branch, Port Safety Division) particularly in the prevention of occupational health hazards.
11. The maintenance of an active working status of those employees who sustain minor injuries.
12. The maintenance of civilian employees' medical records.
13. The submission of appropriate recommendations to the Port Commander for the improvement of working conditions and other matters directly affecting the health and well being of the port employees.

Although the above functions are delineated by the Office of the Surgeon General, they are not intended to be "all inclusive or limiting" but are subject to interpretation as local facilities allow. In those installations where facilities are complete, a more accurate and a fuller execution of this medical mission will result.

The broad and over-all objectives of an Industrial Medical Program are most manifest where a complex labor market exists and direct and forceful competition is offered by the adjacent hiring agencies, such as shipyards and manufacturing concerns operating under war contracts. In an effort to meet an acute labor shortage, full facilities must exist to maintain the personnel of an Army installation in a peak of performance and thus obviate a high labor turnover. All ports of embarkation are military stations, by definition, on one or another of the coast lines of this country and, through the peculiar vagaries of war, must draw a certain number of their employees from an itinerant population group whose previous skills, occupational talents, training, and, in many instances, capabilities, bear no relationship whatsoever to the jobs destined for them at Army ports.

The migration of population groups, as has been the experience during all mobilization periods, results in the spread of contagious diseases, at times producing large non-effective working groups. In like manner, mass movements from which some employees are drawn, emanate from sections of the United States wherein the population demonstrates a marked lack of any physical fitness at all commensurate with the requirements of the job and often a poor mental caliber. In addition, on draining all possible employment areas, one inevitably derives large numbers from the "skid-row" sections of a great metropolitan area, with their attendant nutritive deficiencies and chronic disabling illnesses. Relating this redistribution of geographical groups to the immediate recruitment and placement problem of the Civilian Personnel Branch of a Port of Embarkation, it is found that proper placement of such prospective employees must, perforce, be a studied and carefully planned procedure. Maintaining these workers in a maximum of health so that full efficiency on the job may result, infers a continuous health education program through all media known to modern advertising. In most instances, a mere few words about the state of one's

"The local care of the burn should start THE INSTANT the burn occurs . . ."

—Caulfield, P. A.: Therapy of Burns, Med. Annals of the District of Columbia, 13:251-253 (July) 1944.

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health will not suffice. The Medical Department found itself faced with the problem of educating a working group first in the disease picture itself. Once the worker is familiar with the disease or diseases that may be extant, it is then possible to begin the measures of preventive medicine which can frustrate the worker's own health negligence. The finer points of health promotion or protective medicine can be brought home to many of these employees only after vivid and sometimes frightening pictures of various clinical entities are painted verbally in loud popular jargon, or by the printed word through sharp illustrative material.

Regulations

CONVERTING a concept into material practice, required the creation or visualization of the *modus operandi*, and a detailed publication, "Standard Operating Procedure of the Industrial Medical Program, ... Port of Embarkation," was written, which implemented the program and delineated with clarity the administrative methods to be employed in executing it as required by the Surgeon General. Produced under the name of the commanding general of the port, this manual directs that the procedures therein set forth will be complied with by all concerned. Thus, with official direction governing the program locally, the difficulties encountered in private industry of "having to sell" top management were obviated.

As may be seen by the table of contents (Table 1) all aspects of an industrial medical plan were described and full provisions made for a complete understanding by all

TABLE 1.

TABLE OF CONTENTS OF STANDARD OPERATING PROCEDURE INDUSTRIAL MEDICAL PROGRAM, ...PORT OF EMBARKATION

I.	General.
II.	Industrial Hygiene in Development.
III.	War Department Directives.
IV.	Officers.
V.	Functions.
VI.	Pre-Placement Physical Examinations.
VII.	Periodic Physical Examinations.
VIII.	Out-patient Care for Traumatic Injuries Incurred in Line of Duty.
IX.	Out-patient Care for Occupational Illnesses.
X.	Out-patient Care for Non-occupational Traumatic Injuries.
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personnel connected with the medical service of patient routing procedures, use of blank forms, and of required reports, and, in addition, contained copies of all current and pertinent directing circulars, letters, memoranda and bulletins of the Army Service Forces.

In this manner not only were physicians, technicians and clerks familiarized with the actual administration of such a program, but learned of the *raison d'être* for every requirement. With this publication serving as a guide, new personnel employed in the operation of the program could be indoctrinated in the complexities of rendering medical care to many thousands of workers in a short period of time. It likewise precludes many of the operating errors resulting from a rapid personnel turnover. In a port city this is of unusual importance, as many of the staff of the medical service are service dependents, not likely to remain long in a strange area following the departure for overseas destination of their immediate kin.

Personnel

A. PHYSICIANS: The accepted Minimum Standard for Medical Service in industry as presented by the American College of Surgeons[5] has been recognized and adopted whenever possible. In order to effectuate such a standard, a careful selection of Medical Corps officers must be made, and civilian Civil Service appointee physicians chosen with care—by so doing, a competent and enthusiastic staff is secured.

The Chief of Transportation has stated that one physician is required for 2500 to 3000 workers, depending upon the work load, and for every 750 to 800 employees, one industrial nurse should be in attendance[6]. In an active industrial front line organization working "round-the-clock" a complete medical staff is not only a vital necessity but is also the heart of any success resulting from this type of medical scheme. The desirable attributes of a physician engaged in industrial hygiene have been presented very well by the American College of Surgeons[5] and are familiar to all. In comparable style, a nurse in industry should possess certain personal qualifications and these, as outlined by Barkley,[7] are:

"The following personal qualifications are of the utmost importance for the nurse in industry: an interest in and ability to work with all kinds of people; good physical health and emotional stability; initiative; good judgment; resourcefulness. For the nurse working alone without nursing supervision, ability to organize her service is also necessary. The supervisor of other nurses must have qualities of leadership, executive and teaching ability, vision, and imagination."

Medical officers and civilian physicians available for War Department assignment and employment, being included in the scarce personnel categories, the fullest utilization of industrial nurses must be made and capable members of the nursing profession must be secured from civilian ranks. In view of the present existing nursing shortage, industry by necessity, must employ graduate nurses for functions that they alone can perform, and administrative and clerical details must be delegated to non-professional assistants in all instances.

B. NURSES: The National Association of Manufacturers[8] believes two hours of nursing time for each unit of 100 employees to be the minimum offering for a good industrial nursing service. It has been the experience of this port that graduate nurses provide by far the best service to the civilian employees because of their ability to share medical responsibility, a factor not possible in the utilization of such quasi-medical personnel as medical aides, technical assistants, medical technicians, or even those individuals who had completed basic standard first aid courses. In a rapidly moving industry with both a large personnel and production turnover, quickness of decision and accuracy of medical judgment are of paramount importance. Only an experienced nurse can provide such help to the busy industrial physician. The nursing care that she can give occupational injuries and illnesses and such emergency care authorized for non-occupational illnesses must be of the finest and must be productive of no repercussions as to errors or inefficiency of such service.

In the early developmental phase of the port's civilian medical service, a small group of medical aides was employed, to serve in a first aid capacity and work in close cooperation with the few graduate nurses procured at that time. These individuals had some elementary first aid training and, in the course of time, with the acquisition of nurses trained in industrial procedures, these aides were gradually replaced. Since those formative days, a full complement of nurses has been providing not only excellent assistance to the industrial physician but has also offered sound care to the patients and aided greatly in health promotion at all opportunities.

The present-day industrial nurse is engaged in many

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activities,[9] i.e., assistance to the administration in the management of the plant medical department; nursing care of occupational injuries and illness; emergency care of non-occupational illness; participation in the medical examination program; assistance in the accident control and safety education program; assistance in environmental sanitation; participation with the plant welfare program; and nursing service to the ill or injured worker at home in those communities throughout the country where there is a temporary lack of sufficient medical service.

These functions are carried out under the supervision of a Chief Industrial Nurse who, in addition to supervising the work of the other nurses at the Port Dispensary proper, maintains daily liaison with those in charge of the sub-dispensaries. (In full sympathy with SCHRAM who has voiced so strongly a protest against the term "First Aid Stations,"[10] these sub-stations are termed United States Army Industrial Dispensaries, ... Port of Embarkation.) At monthly intervals, an office-to-office canvassing of supervisors, walking-bosses, foremen, etc., is conducted by the Chief Industrial Nurse to determine the response accorded all aspects of the program. In this manner of pulse-taking or human sampling, errors of commission can be rectified and additional features added if the demand warrants; an engaging professional person can secure more information vital to the medical service with this approach than can result from questionnaires, suggestion slips, or group conferences.

At other installations under the jurisdiction of the Port Headquarters, such as staging areas or army bases, industrial nurses are also on duty, who communicate directly with the Chief Industrial Nurse in the settling of local problems. All nurses are instructed to utilize those minutes during application of a dressing to drive home bits of health advice or points in safety. If not busy during the day, they are instructed to wander about the plant or adjacent office buildings and meet the worker *at his job*, study his environment, the sanitary facilities of the area, and know the toxic substances encountered by the worker, so that advice offered will be respected and followed because the nurse will then be "practically one of us" and not an unknown busybody from the "front office."

The fullest utilization of industrial nurses is encountered in connection with the Industrial Dispensaries mentioned above where, under the direct supervision of the Port Industrial Medical Officer, the nurse renders medical care in accordance with existing standing orders. Through the providing of accurate medical service, the nurse is able to: keep the employee in optimum health and on the job, and help him maintain his maximum earning capacity; reduce, in part, heavy production costs caused by lost time and undue labor turnover; promote harmonious relations between the employer (who in this case is the United States Government represented by the Chief of Transportation) and the employee, and serve as liaison between the worker and his supervisor in all matters pertaining to his physical and mental welfare.[7]

Specific duties of industrial nurses at the Port of Embarkation are the following:

1. Assisting in all pre-placement physical examinations on prospective women employees.
2. Assisting in all periodic physical examinations conducted on women employees.
3. Taking of cultures in connection with food handler examinations, as outlined in Army Regulations.[11]
4. Assisting in medical exit interviews.
5. Conducting post-sickness absenteeism inspection as a screening, prior to examinations by the physician.
6. Assisting in health education program through individual conferences with employee patients, and group conferences with well workers.
7. Determination of workers' accommodations in adjacent offices or sections whose employees receive care from the industrial dispensary headed by that particular nurse.

Liaison with the Port Industrial Medical Officer and Chief Industrial Nurse.

9. Liaison with the Director of Health Promotion.
10. Liaison with the Port Nutrition Consultant.
11. Clearing of emergencies sufficiently severe as to warrant immediate attention of a physician.

All industrial nurses execute their designated functions under standing orders which are modified form of those orders offered by the Council on Industrial Health.[12] In those cases demanding attention of a physician or surgeon, an active ambulance service is maintained so as to allow immediate evacuation of the ill or injured employee to the next echelon of medical care. In an effort to acquaint industrial nurses newly employed in the Program with attitudes appropriate to the care of the sick and injured, general professional demeanor, and practices of individual hygiene, which will serve as outstanding examples to the worker contacted by the nurse, a course in personal relations has been devised for those nurses, in addition to other personnel, as part of the Industrial Medical Program.

C. DENTISTS: Although no provisions exist for extended dental prophylaxis or therapeusis to civilian employees by Army Medical installations, completely equipped dentists offer emergency care for "painful or distressing symptoms" and may include extraction if indications warrant. An industrial dental service is not a major portion of the program, as complete facilities are available in the downtown metropolitan area immediately adjacent.

D. DIRECTOR OF HEALTH PROMOTION: The Director of Health Promotion fulfills by far one of the largest functions of the plan, but strangely enough this particular activity, be it stressed or neglected, is still in search of a suitable yardstick. Through use of posters, created locally, pamphlets, commercial health "literature," conferences, motion pictures, and in-plant visits, modern ideas of physical fitness and medical well-being are spread throughout the port and its installations. Pamphlet removal serves as a poor criterion of informational disbursement, for, though the material leaves the racks, its ideology may never be assimilated. Albeit, the materials are there for the taking, and, with constant presentation, health information is ever available.

E. NUTRITION CONSULTANT: Nutrition information is offered through the services of the program's Nutrition Consultant, who provides not only detailed dietary advice to patients on specifically prescribed foods but also information on the basic foods, preparation of box lunches, the importance of breakfast, and food-handling sanitation. Much of the printed medium is distributed and certain nutrition bulletins are written and printed at the port. In addition, the Nutritionist serves in an advisory capacity to the managers of the eating facilities at all installations, and attempts to correlate into the food selection offered, principles of adequate nutrition.

F. ADDITIONAL PERSONNEL: Skilled technicians execute all of the semi-professional functions and are classified as: Dental Assistants; Dental Laboratory Mechanics; Laboratory Technicians; Medical Technicians (Immunizations); Medical Technicians (Male Physical Examinations); Physiotherapy Aides; X-Ray Technicians.

Additional professional personnel are comprised of optometrists and pharmacists, whose duties are the usual ones, except that the former group is also responsible for the prescribing, ordering and adjusting of safety spectacles and goggles.

It has been found through experience that much of the success of such a medical endeavor as this derives from a group of employees, classified by us as clerk-receptionists, whose enthusiastic and careful registration and routing of patients is productive of much good will, and who will occupy positions fully comparable to those of the well-liked office nurses of private practice. There are one or possibly two of such employees in each professional section of the Port Dispensary and, through a cheerful approach to the incoming patient, much of the dread in the eyes of the patient of a large group practice can be obviated.

Medical Facilities

THE general plan of the Port Industrial Medical Program provides for a main Port Dispensary and several satellites or sub-dispensaries near the Port Headquarters proper, with a smaller but "main" Industrial Dispensary and sub-stations at each of the various military posts within the jurisdiction of the Port.

The Port Dispensary is a complete out-patient depart-

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ment with separate clinics for all specialities which include gynecology, ophthalmology, otorhinolaryngology, radiology, clinical laboratory, dental clinic, processing service (all forms of physical examination), immunization service, surgery, main dressing room, physiotherapy and orthopedic surgery.

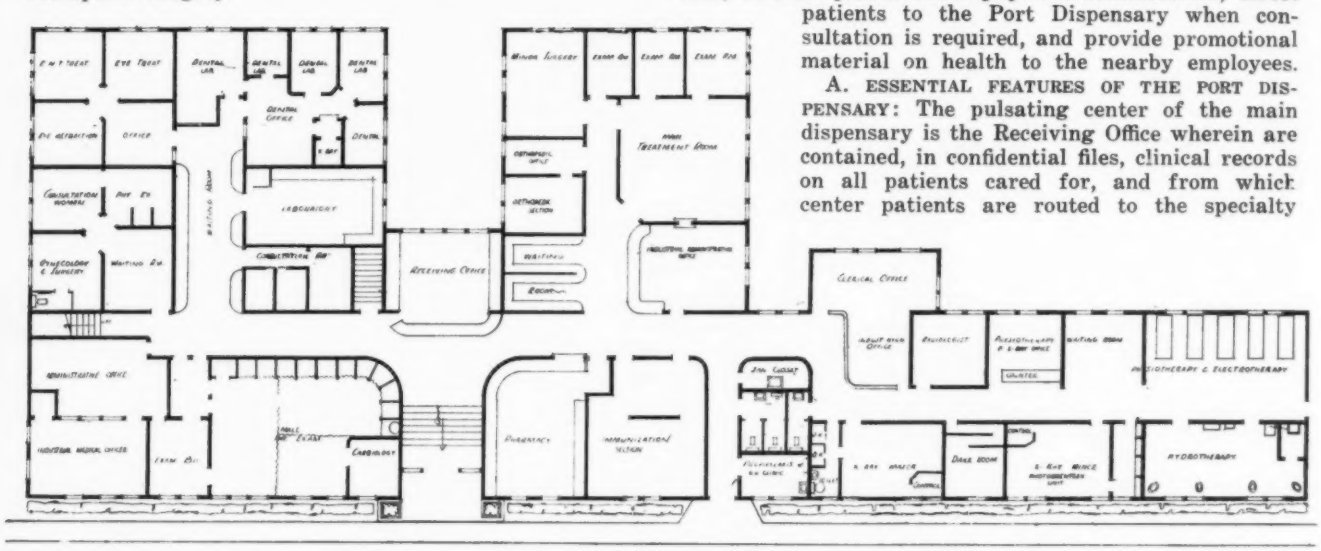

Fig. 1.
Floor Plan of the Port Dispensary

As may be seen in Fig. 1, the floor plan represents a modification of the hub of a wheel with radiating corridors emanating from the central activity or "Receiving Office." Being an 80 year old structure which has recently been streamlined into a modern clinic in functional design, certain opportunities were presented which allowed re-designing of the building to match the case load in type and peak. Because of a fairly accurate allotment of space, only a negligible amount of alteration has been necessary since the original conversion.

The Industrial Dispensaries, each in charge of a nurse, are scattered about strategic areas within the Port, and have been established in both Army owned and leased structures. Every effort is made, when the size of the worker population warrants, to provide good medical care within almost immediate access. Thus these dispensaries have been built into pier sheds, warehouses, or structures in close juxtaposition to large and well populated office buildings. Ordinarily no separate facility is made available for fewer than several hundred workers but in exceptional cases where the type of occupation will make activation of a dispensary mandatory, a station is provided.

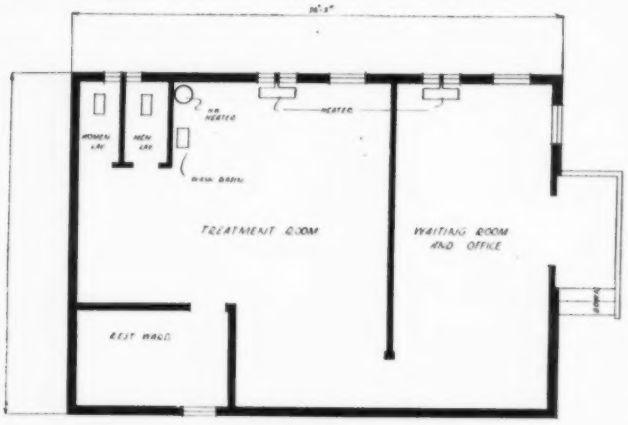

Fig. 2.
Floor Plan of a Typical Industrial Dispensary

The average floor plan of such a station will be seen in Fig. 2, consisting of three rooms—male treatment room and waiting room combined, female treatment room, and a two-bed rest ward. The usual surgical instruments, medications and medical furniture are provided in addition to the simpler physiotherapy equipment and a hot plate, so that patients may be offered hot fluids when needed. All stations of this type are painted in bright colors and the atmosphere is made as pleasant as possible.

Operating under standing orders, nurses at these Industrial Dispensaries render emergency medical and surgical care, conduct post-sickness physical examinations, direct patients to the Port Dispensary when consultation is required, and provide promotional material on health to the nearby employees.

A. ESSENTIAL FEATURES OF THE PORT DISPENSARY: The pulsating center of the main dispensary is the Receiving Office wherein are contained, in confidential files, clinical records on all patients cared for, and from which center patients are routed to the specialty clinics (Fig. 3.). Apart from certain military "Sick and Wounded" records, but two sets of files are maintained—three-by-five card index file of patients, which provides certain identifying information and the number of their chart clinical record, and the second group, manila folder records, details of which will be discussed later.

A long front counter allows simultaneous attention to several patients, either new individuals requiring registration, or those employees on repeat visits. As a part of work-simplification procedure, spaces for blank forms, comprising the skeleton of the clinical record, are immediately beneath the counter and the drawers of file cards are evenly distributed among the chart drawers.

All medical records, particularly the copies of preplacement physical examinations, are kept as confidential by the Medical Department,[13] and no access is had to these files by anyone but the record office personnel or interested staff physicians. A messenger maintains a rapid chart flow between the Receiving Office and the specialty clinics and serves particularly well in the distribution of clinical records "pulled" for those patients having clinic appointments. As in the large civilian out-patient clinics, a stamped chart precedes the patient to the section with which he has a pre-arranged appointment.

B. WAITING ROOM. In so far as possible, separate sectional waiting rooms are maintained and serve to keep male and female patients fairly well divided—likewise some division of the military and civilians can be effected. In those sections where individual waiting chairs are not present, a built-in wall bench with sloping back and seat lining the corridor, makes the best of what is ordinarily a hard wooden seat (Fig. 4.). In those sections where many female patients are encountered, particularly pleasant waiting rooms are provided, with magazines, lamps, etc.

C. MAIN DRESSING ROOM: Serving essentially as a clearing station for the diagnosis and treatment of the male sick and injured, the main treatment and dressing room is a large area characterized by a unit handling of the individual patient. As seen in Fig. 5, five treatment units are spaced in the center of the room, each complete unto itself as to medications, dressing materials (sterile gauze, bandages, and adhesive tape) blank forms, waste receptacles, irrigation basins and surgical instruments. In addition a side disappearing foot rest, at 18 and one-quarter inch height renders the treatment of the average foot or ankle condition easier for all (See Figs. 6 and 7.). The patient ordinarily is seated at one side, the physician on the other, and the nurse or orderly may stand by for such assistance as will be required. For simple medical com-

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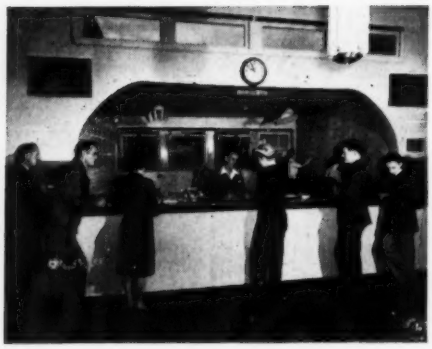


Fig. 3. Receiving Office, Port Dispensary—Fig. 4. West Corridor, Port Dispensary, showing Specialty Clinics—Fig. 5. Dressing and Treatment Room of Port Dispensary, showing utilization of individual treatment units by physicians and nurses

plaints or re-dressing, this type of unit assembly is ideal, and it is replenished with frequency.

Backing the entire room is a combination sink and work table, which contains small splinting materials, surgical trays of sterile instruments, additional assorted sterile dressings, soak basins, space for soiled linen, and a trash chute which leads to a large waste receptacle in the basement beneath. Linoleum surfaced and backed, the average equipment accident of spilled alcohol or colored solution can cause no concern because of constant waxing. The top serves also in the caring for sterilizers, transfer forceps and dressing containers. Facing the treatment units is a two-purpose waiting bench, the hinged seat of which allows storage of large splints, canes and crutches.

Immediately adjacent to the Dressing Room is a short corridor which provides ingress to the Dispensary from

Fig. 6. Individual Treatment Unit Closed—Fig. 7. Individual Treatment Unit Open, showing dressings, medications, blank forms and waste receptacle

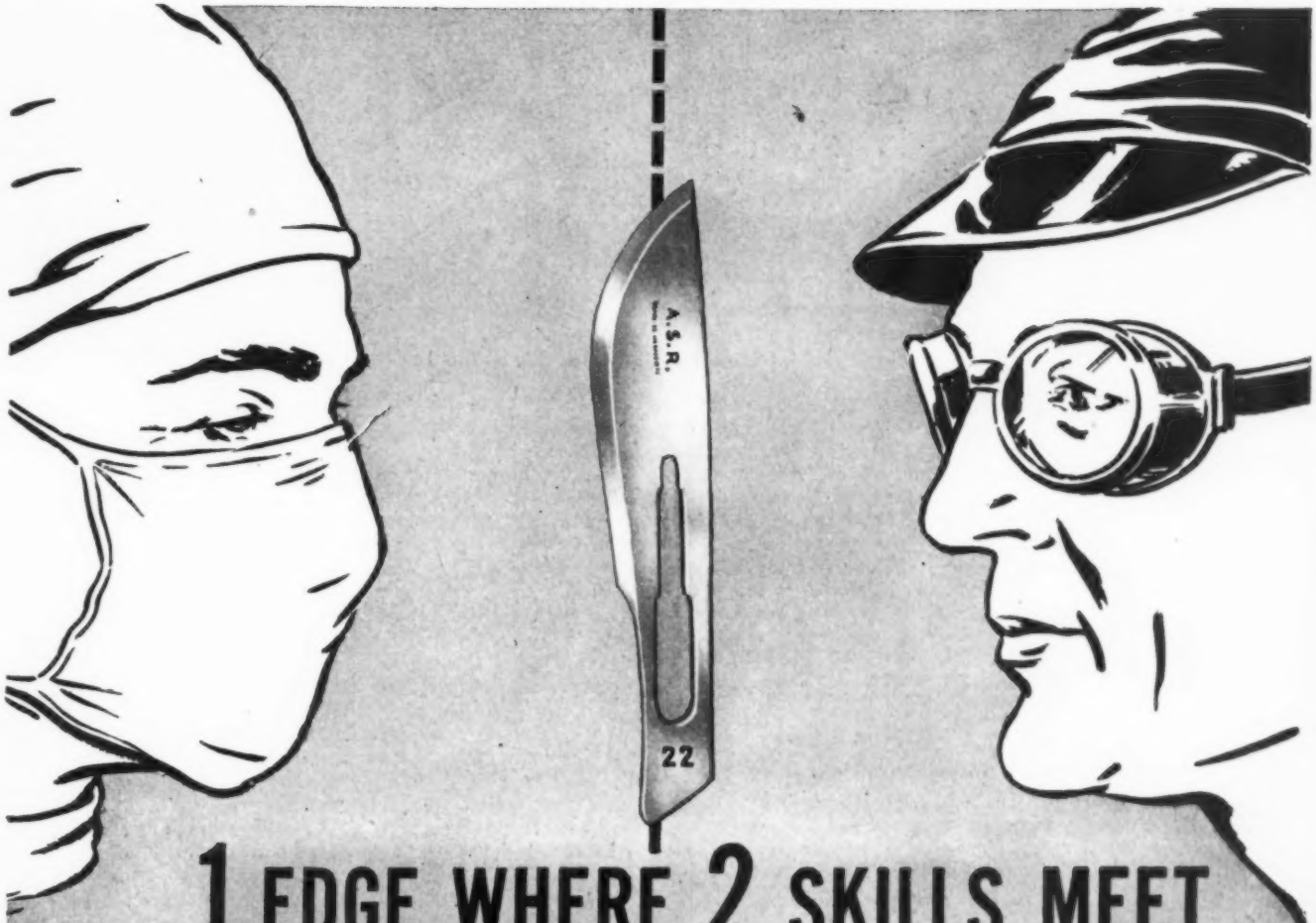
an ambulance entrance where, through appropriate ramping, the floor levels of the standard army cross-country type ambulance and the building are equalized. On the wall of this ambulance corridor are such materials as are needed in the transportation of the sick, as a wheeled guerny, invalid chair, rack of six field litters with retaining straps, and a Stokes litter, the availability of which is mandatory at a Port where evacuation from shipside in cases of accident or illness is encountered with frequency—this among workers engaged either in the conversion of liners or freighters to troop carriers, or in the course of usual in-port repairs. An outside telephone spotted in this same hallway allows immediate notification of concerned personnel in event of sudden illness, accident or death.

Adjoining the main Treatment Room are three separate examination rooms wherein may be conducted such diagnostic or therapeutic procedures as demand privacy. An operating room for minor surgery is completely equipped, allowing the maximum of surgical intervention, particularly in traumatic cases, so that the injured worker may be returned to his job. In-patient care in those installations offering hospitalization to injured government employees under the provisions of the United States Employees' Compensation Act, is, through necessity, long, and when extended periods of care can be circumvented every effort is made to do so. Hence walking bar plaster jackets are applied with great frequency, and practically all "dirty surgery" cases are cared for in the Port Dispensary. The essence of medical care is time, so that every employee is returned to duty as close to "immediately" as can be judiciously accomplished, even though he be limited to "light" or "moderate" work only—he can do *some* work, and in many instances the employee is grateful in the early return to his job for he values his participation in the emergency at a point so close to the active theaters of operation.

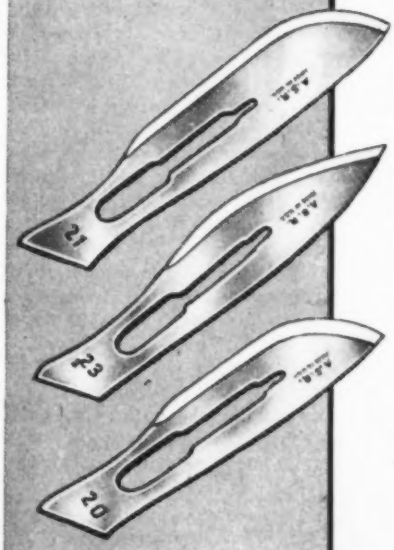
D. PHYSICAL EXAMINATION SECTION (Male): Devoted completely to the conducting of physical examinations on men, this 22 ft. x 30 ft. room contains 12 numbered private dressing cubicles, each equipped with clean dressing gowns and washable slippers, all opening on the large room itself (Fig. 8). Facing a built-in waiting bench is a long desk at which place clerks check the examination papers and take such portions of the medical history as can be recorded accurately by non-professional personnel. Height, weight, chest measurement and vision are recorded and, in the last of the cubicles, which is equipped with a low sink, a urine specimen is left in labelled bottles.

A feature of the room is the built-in desk unit (Fig. 9) which contains, as part, a seat for the patient which is of such a height as to allow a comfortable resting place for the arm for blood pressure recordings. This unit is a double one, and in a small amount of space two examiners

Fig. 8. Male Physical Examination Section, showing private dressing cubicles (curtains drawn that ordinarily separate clerical and examination area)—Fig. 9. Physical Examination Desk and Seat Combination, allowing simultaneous use by two physicians—Fig. 10. Table Employed in the Physical Examination Section in the taking of blood specimens and completion of smallpox vaccination



1 EDGE WHERE 2 SKILLS MEET



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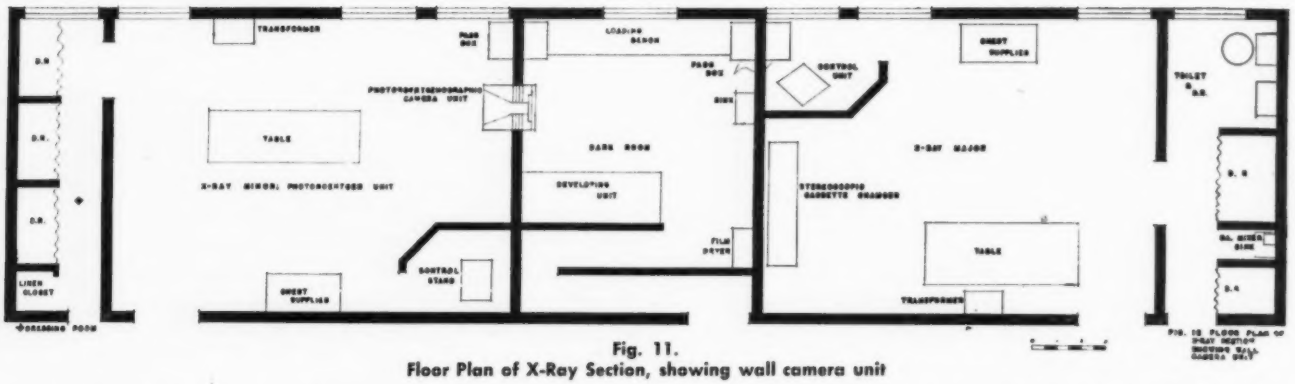

Fig. 11.
Floor Plan of X-Ray Section, showing wall camera unit

can work simultaneously. For accurate chest procedures an inset-room measuring eight feet by nine feet has been sound-proofed, so that the quality of certain heart sounds or chest sounds may be established apart from the noise accompanying a busy examination station.

Again, to shorten the time interval of the examination, an especially constructed table (Fig. 10) allows a technician to do a veni-puncture for the Kahn test, and vaccinate the candidate against smallpox, without his having to go to either the Laboratory or Immunization Section proper. It might be mentioned that the types of physical examinations conducted are seen in Table 2.

TABLE 2.
PHYSICAL EXAMINATIONS CONDUCTED BY THE PORT DISPENSARY

Pre-Placement Physical Examination for Port Employees
Periodic Physical Examinations
Food Handler Examinations
Physical Examination of the Medical Exit Interview (job release)
Physical Examination of the Request for Job Transfer
Medical Clearance Inspection for Overseas Service of Civil Service Employees
Pre-Placement Physical Examination for Government Contract Employees in Alaska, Canada, the Aleutians, and Hawaii
Voluntary Physical Examinations
Re-check Physical Examinations Following Initial Pre-Placement Examination

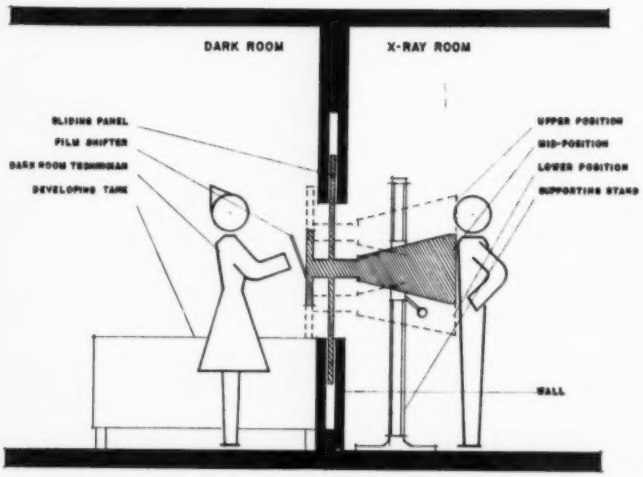

Fig. 12.
Side elevation, showing wall location of Photoroentgenographic Unit

E. WOMEN'S SECTION: Comparable to that section for men in respect to examinations, a separate women's section offers facilities for medical care in addition to those for processing: a single-entranced group of four rooms (Fig. 13) contains a waiting room, a gynecology examination and treatment room, a physical examination room, and a consultation room. Characteristic individual dressing cubicles are provided in this section and emphasize the privacy required in caring for women. An individual lavatory equipped for dressing (and also for the administration of vaginal irrigations) serves as both a time-saver and a tremendous convenience.

All types of physical examinations are conducted here and, in addition to the routine procedures of the pre-placement examination, a pelvic examination is conducted if the applicant for employment so desires. The presence of a woman physician in this section and two attending nurses facilitate greatly the examining procedures.

F. RADIOLOGY SECTION: Being recently activated, a new idea was incorporated in the installation of the photoroentgen unit employed in the taking of four-by-five inch chest photofluorograms. There are two large x-ray rooms each flanking the central darkroom (Fig. 11). Although ingress into the darkroom is from the corridor only, the camera unit of the photoroentgen equipment is placed in a sliding panel in the wall separating the examination room from the darkroom (Fig. 12). Through use of buzzer signals such an installation guarantees rapidity of patient turnover and the technician may remain in the control booth without having to work intermittently at the camera and control panel. Film change is effected by the darkroom technician with no marked alteration in the developing schedule.

G. OTHER FACILITIES: Other sections of the Dispensary include: Eye Clinic (Fig. 14); Ear, Nose and Throat Section (Fig. 15); Dental Clinic (Fig. 16); Orthopedic Section (Fig. 17); Physiotherapy Section (Fig. 18); Immunization Section (Fig. 19); Rest Ward (Fig. 20).

Of these facilities, two features are worth noting—a specially designed physiotherapy Plinth-type table, which with simple mechanical additions makes multi-positional therapy markedly feasible (Fig. 21); a high chair with individual hinged rest steps is used by the side of the

Fig. 13. Waiting Room of Women's Section—Fig. 14. Eye Treatment Room of Eye Clinic—Fig. 15. Ear, Nose and Throat Treatment Clinic

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3. EASE OF READING. Because they are *full-size*, Powers' Radiographs save time and eyestrain for the interpreting physician. Special viewers are supplied as part of the Powers Service.

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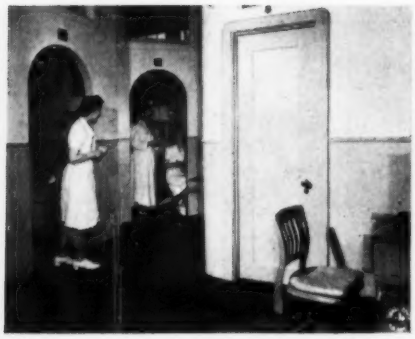

Fig. 16. Dental Clinic, showing entrance to operating rooms—Fig. 17. Orthopedic Section, showing dividing panel with shade, allowing simultaneous examination and dictation—Fig. 18. Physiotherapy Section (cubicle curtains drawn)

whirlpool bath, precluding sitting on the edge of the bath, and providing a comfortable seat wherein adequate support is given the dependent and normal lower extremity, while the affected limb is being treated (Fig. 22). Cubicles are formed throughout this section by use of draw curtains, which when drawn to the walls allow thorough cleaning of the area at each day's end.

Secondly a veni-puncture bench (Fig. 23) in the main laboratory provides drawer space for syringes, needles, skin antiseptics and tourniquets, etc., space for soiled linen in seats and with a central arm rest, either the right or left arm may be employed with no great inconvenience to the patient.

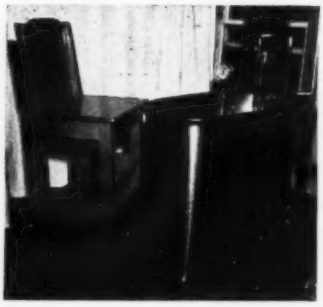

Fig. 22. Chair Employed in conjunction with whirlpool therapy in Physiotherapy Section which allows rest for the dependent lower extremity—Fig. 23. Veni-puncture bench in main Laboratory, showing drawer for supplies and arm rest for use of either arm

Preventive Medical Procedures

A. ORIENTATION OF THE APPLICANT: One of the first contacts that the prospective employee has with the Industrial Medical Program of the Port is through the Employee Relations Section of the Civilian Personnel Branch where a 20 to 30 minute interview ensues between one of the counselors and the employee. During this interview, problems peculiar to the individual are discussed, such as transportation, child care, medical care, hygiene, etc. At this discussion, five minutes are devoted to a brief description of the Industrial Medical Program wherein essential points in regard to sick care, the reporting to the supervisor in the event of illness, and the medical services available, are pointed out. Included in the packet "So Your're New at the Port of Embarkation, ... Here is a Description of Port Services and Community Facilities To Help You," is a copy of the first Industrial Medical Office health bulletin, "The New Medical and Health Program." In this is presented a brief description of medical facilities offered the civilian employees by Port authorities.

Approximately one to two weeks after active employment has begun, an orientation class is held in groups of 20 individuals at which time the Industrial Medical Officer explains in 30 minutes' discussion, the medical services offered the employees at the Port, the mechanics by which these services are secured, and the extent to which the port provides medical care. Some description of the health promotion program and nutrition facilities is presented and, through group questions and answers, the basic fundamentals of an excellent relationship between medical and employee groups are outlined.

TABLE 3.
THE EMPLOYEE AND THE INDUSTRIAL MEDICAL PROGRAM

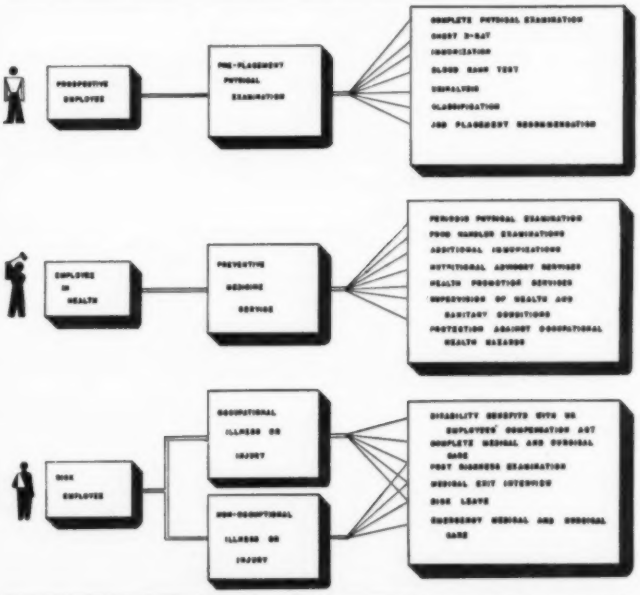

Fig. 19. Immunization Section of Port Dispensary—Fig. 20. Rest Ward of Dispensary Annex—Fig. 21. Plinth Table Used in Physiotherapy Section, showing adjustable head, foot and arm rests, and medication cabinet

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Thus, through the creation of an early rapport with the employee, during the period of orientation, better health is assured through clarification of the medical program. A 32 page bulletin has been proposed, publication of which is now pending approval, wherein with vivid illustrative material and a question and answer type of text, the employee is familiarized with all phases of the program. Cartoon maps locate with accuracy the Industrial Dispensaries spotted through the Port. The pictorial presentation of the medical services which will appear as facing pages, may be seen in the attached table (Table 3—The Employee and the Industrial Medical Program). It is contemplated that one copy of this publication will be given each new employee during the initial orientation period.

B. PHYSICAL EXAMINATIONS: *(1) Pre-placement Physical Examination:* As a portion of the hiring process the employee is directed to the main Port Dispensary for the conducting of a pre-placement physical examination. These examinations, in a large industry, are one of the means whereby the physical and mental well-being of industrial employees is maintained. This is accomplished through careful appraisal of physical findings and accurate placement in a job whose demands match the physical capabilities of the worker.

The objectives of the industrial physical examinations outlined by the Council on Industrial Health of the American Medical Association[14] are:

TABLE 4.
OBJECTIVES OF INDUSTRIAL PHYSICAL EXAMINATIONS

1. To facilitate placement and advancement of workers in accordance with individual physical and mental fitness.
2. To acquaint the examinee with his physical status and to assist him in improving and maintaining personal good health.
3. To safeguard the health and safety of others.
4. To promote cooperative support and understanding of individual health practices by employer and employee alike.

In the accomplishment of these objectives a complete examination is made. Employing the "Medical Certificate" form of the U. S. Civil Service Commission, in compliance with Civil Service requirements, the usual procedures are completed. In addition a Kahn test is taken, and, as will be seen by the results to be published at a later date, proves highly worth while. Urinalyses are done including a microscopic examination, and, following a vaccination against smallpox, the patient is directed to the Radiology Section for the taking of a four-by-five inch fluorogram. If the slightest indication exists, electrocardiographic studies are made, as are other laboratory diagnostic procedures. The applications of Selective Service rejects are identified by a code initial so that particular attention will be paid to the psychiatric aspect of the examination. Experience has shown that the average individual classified as "4F" has no accurate knowledge of the reason for his rejection. Consultation with the psychiatrist is usually necessary because of the large number of applicants with diagnoses of psychoneurosis, constitutional psychopathic inferior, mental deficiency, etc. Likewise, discharged veterans are accorded particular care not only because they are given priority[15] but, again, identification of psychiatric conditions must be made in many cases. Ordinarily a conference with the staff psychiatrist is a normal part of the rejectee's or veteran's pre-placement interview. The actual physical examination is conducted in privacy, and every attempt is made to avoid the hurried confusion of the "line-up" type examination.

With the information at hand derived from the examination conducted (exclusive of serological or radiographic findings, the results of which are not immediately available) the applicant is classified as to the type of job for which he is recommended by the medical department. The classifications on which job placement is based are those of Table 5.

In order to categorize the prospective employee in one or more (for example, B2 and B4) classifications, a set of standards has been devised. The bases for Classification A, B1-B7, and C are briefly seen in Table 6.

TABLE 5.
CLASSIFICATION OF PHYSICAL FINDINGS AND RECOMMENDATIONS FOR JOB PLACEMENT

Classification A:	physical condition satisfactory for any type of duty.
Classification B:	physical condition satisfactory for duty with the following limitations:
Classification B1:	approved only for clerical or sedentary type of duty.
Classification B2:	approved only for light manual labor.
Classification B3:	approved only for duty requiring no prolonged standing.
Classification B4:	approved only for duty not requiring excessive climbing or muscular agility.
Classification B5:	approved only for duty not requiring good vision.
Classification B6:	approved only for duty not requiring good hearing.
Classification B7:	approved only for operating of motor vehicles or other moving equipment.
Classification C:	rejected for any type of duty.

TABLE 6.
STANDARDS FOR INTERPRETATION OF PHYSICAL FINDINGS

Classification A: approved for any type of duty
(Prospective employees presenting minor defects only of the back, cardiovascular system, hearing, extremities, vision, weight or skin, are classified as "A" satisfactory for all occupations.

Classification B:
Applicants presenting slight exaggeration of sub-clinical defects covered in Classification "A" will be classified as "B" allowing modified duty in one or more of the divisions one through seven.

Classification C:
Applicants presenting frank communicable disease, malignant disease, or conditions that are uncorrectable for any selective placement, will be temporarily deferred for employment and will be classified as "C."

On completion of the examination certain findings are discussed with the patient in an effort not only to familiarize him with his condition but also to have him understand why he was not recommended for the job of application, if necessary. In several instances in the early phases of the program, individuals would refuse the job when they learned that they were recommended for sedentary duty only, when they had applied, for example, for an arduous occupation such as that of dockseaman. This would result in their leaving to take a job in an adjacent shipyard where pre-placement physical examinations were not mandatory, and where, in spite of rheumatic heart disease or untreated syphilis, they would take a position demanding the severest in physical exertion. Of late, discussions with the applicant have led to the elimination of ruffled feelings, through reasoning, and a better mutual understanding between the employer and the employee has ensued.

Each job at the port has been analyzed on a physical capacities basis and on the physical requirements of that position. The analyses are abbreviated listings patterned somewhat after those employed by Permanente Foundation Hospitals and the War Manpower Commisison[16] wherein accurate definitive descriptions are provided of every job

JOB:_____

JOB ANALYSIS FOR PRE-PLACEMENT PHYSICAL EXAMINATION

I *TYPE OF DUTY*
( ) Arduous manual or skilled labor
( ) Light manual or skilled labor
( ) Clerical or sedentary type duty
( ) Operation of motor vehicles or moving equipment
( ) Other (Explain)_____

II *JOB REQUIREMENTS*
( ) Lifting, heavy
( ) Lifting, light
( ) Climbing
( ) Walking
( ) Standing
( ) Sitting
( ) Manual dexterity
( ) Good hearing
( ) Good vision
( ) Other (Explain)_____

III *HAZARDS*
( ) Mechanical
( ) Chemical
( ) Electrical
( ) Explosives
( ) High places
( ) Other (Explain)_____

IV *REMARKS*
_____

Fig. 24.
Job Analysis Form (brief)

in the yards. The form employed is seen in Fig. 24, and a complete alphabetical file of approximately 239 jobs currently filled at the port is on the desk of every examining physician for ready reference. Each job is classified in one or more of the categories listed in Table 5, omitting in the main, Classification "A," as that fits all jobs, and "C" as that precludes all positions. These analyses tell the examiner, who personally may or may never get

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Niacinamide	20 mg.
Vitamin C Ascorbic Acid	50 mg.
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into the Port facilities, exactly what is required by that job. If the occupation is classified as "B3" and "B5" and the applicant qualifies, there is complete agreement and the man is recommended for the job he desires. If he desires work in the "A" classification, where the physical demands are rigorous, and he is estimated on the conclusion of the examination as "B1," adjustments and job placement must be made.

The Civilian Personnel Branch (Recruitment and Placement Section) is equipped with a cross-indexed list wherein are provided a listing of all jobs derived from the medical department's classification cards, and a bracketing of jobs as to classification. For example, the following shows the method:

TABLE 7.
CLASSIFICATION OF SOME OCCUPATIONS

Occupation	*Classification*
Crane operator (over 25 ton).....	A, B3
Dock Seaman, Gang Foreman.....	A, B2, B3
Lift Truck Operator.....	A, B3
Office Appliance Repairman.....	A, B2, B3, B4, B7
Sheetmetal Worker, Helper.....	A, B3, B4, B6
Tallyman	A, B1, B2, B3

TABLE 8.
CLASSIFICATIONS SHOWING OCCUPATIONS

B1	Gas and Oil Attendant
	Saw Filer
	Vehicle Checker
B2	Convoy Driver
	Cooper, Foreman*
	Railroad Conductor
B3	Boilermaker
	Cement Finisher
	Laborer, light, warehouse
B4	Cooper, Foreman*
	Machinist, Helper
	Shipfitter, Junior
B5	Linen Room Attendant
	Painter, Auto
	Yardmaster, Assistant
B6	Body Repairman, Senior
	Stockpicker
	Welder, Helper
B7	Clerk-Typist
	Fork Lift Operator, Foreman
	Janitor, Junior

*Several occupations are classified under more than one heading.

If an applicant is returned to the Personnel Section as unsuited for unrestricted labor (Classification A) it is then the responsibility of that section to select a B2 or B4 job for him, if such job classification is recommended. It is then determined which B2 or B4 jobs have vacancies, and if the applicant is otherwise qualified he will then be hired in that position.

This system provides accurate job placement and fully legitimizes use of the term *pre-placement* physical examination, which phraseology has supplanted the now outmoded designation of *pre-employment physical* examination. The job is matched with the worker with a great degree of accuracy, thus precluding any physical breakdown of the employee in a position overtaxing his organic capabilities. It must be mentioned that if positive chest findings are encountered following photofluorography, employment may be rejected completely or modified. Positive blood tests do not proscribe the applicant's reporting for work, but do demand follow-up care, which is accomplished by the city health department, to be described later. As the majority of candidates can work immediately, we do not allow the x-ray or laboratory procedure to hold up hiring. As both percentages of positives are low, this practice is not fraught with danger.

2. *Periodic Physical Examination:* The periodic physical examination is conducted semi-annually on certain personnel, to wit:

TABLE 9.
PERSONNEL EXAMINED PERIODICALLY

Brazers.	Railroad Engineers.
Crane Operators.	Sand Blasters.
Firemen.	Sedan Drivers.
Lift Truck Operators.	Truck Drivers.
Painters.	Welders.
Workers exposed to carbon tetrachloride, benzine, etc.	

These examinations are conducted in order to protect both the worker and his associates, and also to prevent loss or destruction of costly government equipment through impaired health of their user. The examination forms are dated and, by placement in a suspense file, appear at dates six months subsequent to the last checking. These individuals are then called up and the following procedures are accomplished:

TABLE 10.
PROCEDURES OF THE PERIODIC EXAMINATIONS

Physical Examination:	
Eyes.	Heart and Lungs.
Ears.	Hernia.
Nose and Throat.	Varicosities.
Nervous.	
Laboratory Procedures:	
Red Blood Count (in painters and workers exposed to solvents).	
White Blood Count (in painters and workers exposed to solvents).	
Photoroentgen chest studies.	

All such key personnel are classified in the same manner as that employed with the pre-placement physical examination. If a change in this classification is necessary, the Employee Relations Section is contacted and job change is arranged. Here again, explanation is offered the worker so that he understands the otherwise complex machinations of a big medical service.

3. *Food Handler Examinations:* As required by Army Regulations[11] *food handler examinations* are conducted on all such workers throughout the Port at monthly intervals. On hiring, such an examination consists of the following procedures:

TABLE 11.
PROCEDURES OF A FOOD HANDLER'S EXAMINATION

Physical Inspection.*	Blood Kahn Test.
Bacteriological Study of Feces.	Chest Plate (Fluorogram).
Parasitological Study of Feces.	Certification.

*Almost all food handlers are post exchange employees and not paid from appropriated funds, thus not under Civil Service pre-placement physical examination requirements.

All such employees presenting positive findings on stool culture or smear studies are released from food handling. Those with positive Kahn tests confirmed in their reaction by two successive serological examinations are allowed to work provided no active lesions are present but are reported to the City Department of Public Health for medical follow-up care and placement. This type of examination is conducted every six months. Each month, a physical inspection for the determination of presence of communicable disease is conducted and results noted on a card, the form of which appears in Fig. 25.

112

FOOD HANDLER MONTHLY EXAMINATION RECORD

NAME | ORGANIZATION

The above named food handler was physically examined as prescribed by Par. 12, AR 40-205 on the dates set forth below and found to be free from communicable disease as attested by initials of examining Medical Officer.

Date	M.C.	Date	M.C.	Date	M.C.

SEMI-ANNUAL EXAMINATION—COMPLETE

Date	Wassermann	Feces Bacteriology	Feces Parasitology	Chest Plate	Remarks	M.C.

Fig. 25.
Food Handler Examination Record

4. *Special Examinations*: (a) Post Sickness Examinations: In an effort to reduce absenteeism due to sickness* it has been made mandatory at all port installations to check personnel returning to work after any absence resulting from illness of 24 hours or longer. Each worker, after reporting in at his section, is then seen at an Industrial Dispensary where he is interviewed by either a doctor or industrial nurse. The temperature is taken, and the patient is asked as to his illness in such a manner as to determine whether his illness were genuine or pure fabrication of story. If claim is laid to a cold, for example,

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the part concerned is examined, and a thorough check of the respiratory system is made. If no evidence of immediate or recent illness exists, the lack of findings is explained to the patient and not infrequently an admission as to the absenteeism activity is made.

If it is found that the patient is still suffering from his absence-causing complaint, he is advised to return home for complete convalescence and his foreman is notified of this action. In this instance, or if the patient has recovered from a "legitimate" illness, he is advised as to the proper procedure the next time he becomes ill. Health education can be practiced with much resultant good at this time.

It has likewise been established that no employee can be sent home sick by his section chief or leave work of his own volition because of claimed sickness. He must check through the dispensary prior to such action, and, if deemed sufficiently ill to warrant going home, this is sanctioned, and the man's supervisor is informed of the decision.

This portion of the program when initiated was provocative of much ill will, as it was felt by most section heads to be a "waste of time." However, in the intervening months, the supervisors have swung around quite completely in their thinking and now request accurate checks of either feigned or genuine illnesses manifested by their employees. It is a Civil Service requirement[17] that all government employees who have absented themselves for a period of three days or more, must present a certificate on return to work signed by a physician or recognized practitioner, stating that they had been under the professional care of the physician during that period of absence. In view of the currently existing shortage of civilian doctors, every effort has been made to impress the value of reporting a beginning illness to the medical department. By so doing, advice can be given and in this manner the Dispensary staff can serve as the certifying physician.

It has been felt definitely that this post-sickness examination and dispensary clearance prior to going off "sick" have been instrumental in lowering the percentage of sick leave from 3.6% to 1.80% during the first six months of activation of the program. Of course, how much of this reduction resulted from the employees taking a certain amount of this time as *annual* rather than *sick leave* cannot be determined. The creation of a psychologic block, in addition to the practice of preventive medicine, is a valuable factor in the *modus operandi* of reducing sickness absenteeism.

(b) *Medical Exit Interview and Examinations*: An employment release or certificate of availability[18] must be issued by the Civilian Personnel Branch in all cases of job transfer of the inter-agency type, or from Federal employment to essential industry and vice versa. Many reasons are provided by the prospective transferee as a basis for the granting of a release from the Port. In those instances where the employee claims ill health as his reason for leaving, the Employee Relations Section will refer him to the Medical Department for examination and recommendation. A thorough checking of the symptoms presented will ensue, and, in a few cases, release from Port employment is advised—this only when positive findings are encountered which heretofore had either not been detected, or pertinent history at the time of the pre-placement physical examination was lacking. Complete x-ray or laboratory facilities will be used in ruling out possible medical reasons for termination. It is the responsibility of the industrial medical staff to discourage terminations and transfers through accurate physical or mental estimations.

In connection with this, the worker will present all too frequently a letter from his private physician stating that the patient's occupation is detrimental to his health—an assertion made with absolutely no knowledge on the part of the practitioner of the place of employment, its hazards, its health facilities or its immediate relation to his patient's health. All such reasonings presented are thoroughly investigated so that, if true, local confirming evidence will support the claim.

(c) *Special Consultations*: Serving as arbiter and adviser, the medical staff attempts to unravel and rectify those cases of employee maladjustment that have come to the attention of the employee counsellors. The nervous employee, well described by DR. DOROTHY L. FRAME* wishes day shift rather than night, or thinks she is better suited for driving than filing, or feels that working at this warehouse is better than the other. Complete with problem, the workers are referred for solution, most frequently for analysis by the psychiatric member of the staff. All attempts are made, following conference with the worker during which he is allowed to talk himself out, to spot the ill relationship between foreman and worker, to put the finger on the difficulties of the climacteric or isolate the causative agents in a troubled family scene. Not infrequently the true psychotic is discovered, and confirming diagnoses must be sought and service termination gone through rather than attempting readjustments on the working scene. By combining the investigative efforts of the psychiatrist with the therapeutic capabilities of the counsellor, many disturbing work situations can be eliminated, the worker saved and shipping schedules maintained.

Immunization Program

MUCH "granny magic"[19] and traditionally mal-channeled thinking make the immunization aspects of a preventive medical program difficult. Protecting injections are feared and resistance to "shots" is manifested with the same intensity as is the malevolent panegyric of the anti-vivisectionist. The workers do not wish any "needles stuck in them," and they "don't want nuthin' put in their blood." The combatting of opinions rendered immobile by sheer narrowness of thought defies all the capabilities of active health education. The value of smallpox vaccination is broadcast through posters. The availability of immunization is published with frequency in the Port information bulletins and the value of prophylaxis is spread verbally by an interested staff. And now and then a rare employee will ask for a series of injections. Some of this program, however, is mandatory, and those personnel contacting returning ships or prisoners of war must take the initial series of injections of typhus vaccine, through directives[20] from higher authority. With the progress being made in chest and syphilis surveys, it is hoped that adults will soon learn to take injections which they demand faithfully of their own children's health program.

Chest Survey

THE first of a series of chest surveys has recently been completed, the procedure being facilitated greatly by the Port Dispensary's having its own four-by-five inch photoroentgen unit. The survey is in actuality a fairly continuous process in that well over 1200 fluorograms are taken monthly as part of the pre-placement physical examinations done, not only on Port employees, but also on applicants examined for several other War Department hiring agencies. The cross section of the working population of the Port reveals many strata, differing economically, physically, racially and occupationally. The expected findings of circa 1.5% positive plates were demonstrated and will be reported in detail at a later date. The survey was well prepared through several publicizing, media, specifically, individual descriptive health bulletins, posters, personal contacts, and, of most importance, authorizing directives from Port Headquarters.

In cooperation with the muncipal department of Public Health, a survey of longshoremen employed by the Army was conducted to include serological examinations. This was of particular value in that these workers do not receive pre-placement physical examinations yet are rendered care under the U. S. Employees' Compensation Act. Thus, by screening all Army employees on an extensive waterfront, and examining a group of many thousands of office and shop personnel, a definitive case finding program materializes.

Reactions to the survey were of interest. Some indi-

*Proceedings of the General Motors Third War Medical Conference, Newark, New Jersey, April 13, 14, 1944, pp. 17-24.

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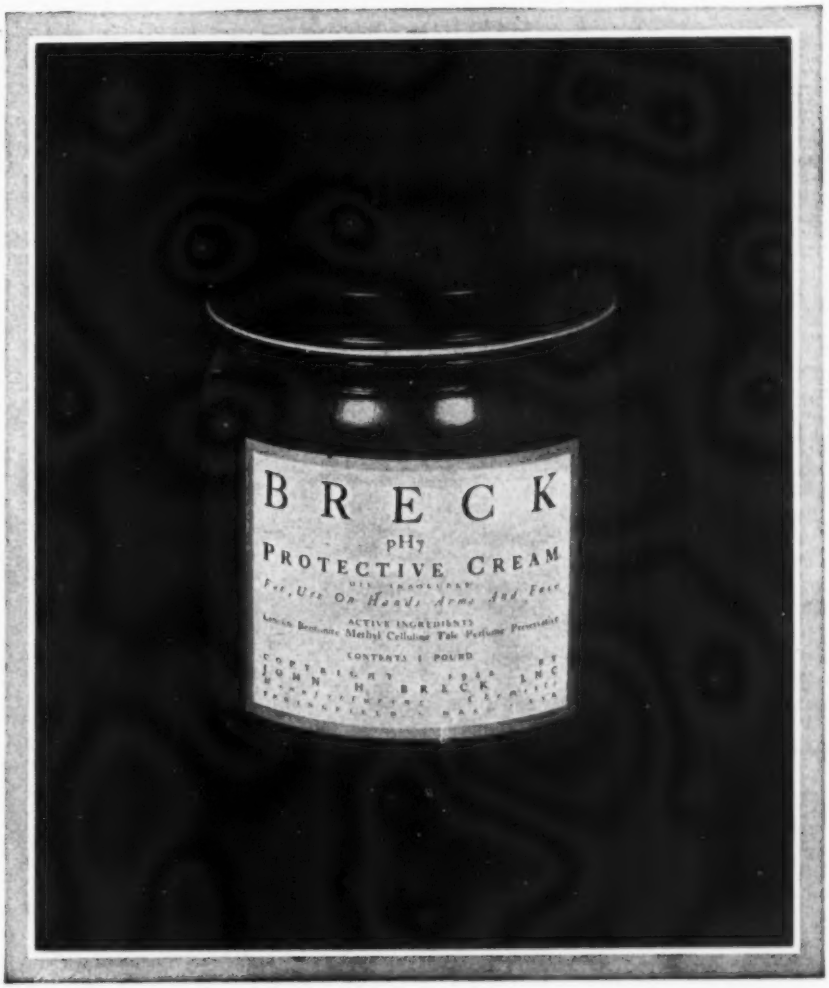

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A well made protective cream is of equal importance to manufacturers and workers alike · The absence of a worker from an industrial plant · because of industrial dermatitis · adds to the manufacturer's difficulties · The worker in turn finds that a minor annoyance may develop into a serious condition · Much industrial dermatitis has been found to be caused by the use of harsh cleansing agents · Breck pH7 Protective Cream often makes it unnecessary to use such agents after the day's work · Highly alkaline creams interfere with the normal acid reaction of the skin · Breck Protective Cream has a pH of 7 which means that it is neutral and does not contain any excessive acids or alkalies

JOHN H BRECK INC · MANUFACTURING CHEMISTS · SPRINGFIELD 3 MASSACHUSETTS
CANADIAN ADDRESS · 47 CLARENCE STREET · OTTAWA

Date_____

FROM: Industrial Dispensary

TO:_____ Section_____

Certain abnormal physical or laboratory findings were noted during your recent pre-placement physical examination. For your own best interests, it is urgently recommended that you return to this dispensary at your earliest convenience for recheck, consultation, and advice.

For the Surgeon, Port Dispensary:

_____ M.C.

PROTECT YOUR HEALTH, YOUR MOST VALUABLE ASSET!

Fig. 26.
Printed Form used during chest survey

viduals criticized the government's "wasting so much money." Others felt this an infringement of their personal rights. Fearing positive results, several resisted all persuasion in taking the examination. Many came in ahead of schedule because their friends had told them of the simplicity and value of the procedure and, ironically, chest pathology was found in these rather than the praise-giving referrers.

While the survey was being conducted at the Longshoremen's Hiring Hall it was interesting to see some workers come in desiring the blood test only, and, on seeing the painlessness of the chest examination, get back in line so as to share in both procedures. The security of group participation was of importance with many, in that a few who were reluctant at first were "kidded" by their colleagues into taking the tests. Section supervisors took pride in having their groups lead in the percentage of employees examined. All those workers in whom the diagnosis of tuberculosis had been made were sincerely appreciative of learning of their infection, and manifested such thankfulness in the form of letters received by those in the medical program.

It is anticipated that a chest survey will be conducted annually. The administrative details are simplified greatly through use of a master roster of all civilian employees, showing sections, occupation, and classification, procured from the Machine Records Section. One representative of the Medical Department can easily contact all section chiefs in the arrangement of schedules, so that with a well-planned survey, employees can be delivered to the X-ray Section and returned to the shops or docks with dispatch. The appointment blank used is that seen in Fig. 26.

Therapeutic Medical Procedures

A. CARE OF INJURIES: Through enactment of the U. S. Employees' Compensation Act of September 7, 1916, the administration of which is vested in the U. S. Employees' Compensation Commission, "Federal employees are entitled to medical care for injuries sustained in line of duty." Because of the many occupations at a port, with workers engaged in ship repairs, an activity not unlike that of our wartime shipyards, a definite number of injuries is constantly encountered. Working on piers, on ships, in large marine repair shops, the workers sustain accidents of varying severity. An active accident prevention program under the Port Safety Division, has reduced the severity and frequency rates to the point of leadership among the ports of embarkation. Not only has that section aided materially in diminishing accidents, but also through accurate investigative work has eliminated the "gold-bricks and chiselers" by spotting non-occupational causes of compensation claimed injuries.

Complete surgical care of the outpatient type is rendered employees who have become injured; hospitalization if required, is provided by the Marine Hospital, U. S. Public Health Service, but four miles distant. Every effort is made to keep the injured worker ambulatory and, through immediate application of plaster with walking bars, or maximum exposure of fingers in cases of forearm fractures, an employee can be returned to his job with a minimal loss of time. If full duty is not possible, modified activity can be carried out and the worker, although partially and temporarily disabled, *can accomplish some work* and is not a time losing absentee. Such type of medical care is emphasized and directed by the War Department in its formulation of the Industrial Medical Program.[1] It is a policy to secure x-rays on all suspected fractures without the slightest hesitation and not to spare the tetanus antitoxin in large prophylactic doses for wounds of the type and history indicating this treatment. A rapid ambulance service minimizes the time lag in serious injuries, and, if necessary, patients can be left at the Port Dispensary for several hours prior to being moved.

Non-occupational injuries can be treated if they provide painful or distressing symptoms to the patient while at work. Ordinarily those injuries demanding protracted care will not allow the individual to carry on his work, so most medical attention in these cases is, perforce, brief. The basic premise of the program is manifested here in keeping the worker *on the job*. If simple care will accomplish this, it is provided without question.

B. CARE OF ILLNESSES: Emergency care is provided for minor illnesses manifested on the job, and most of these conditions are non-occupational in origin. The commoner causes of illness as seen in industry at large, lead in comparable proportion at the Port, and most of the respiratory, gastro-intestinal and menstrual disorders can be treated with little time lost. A 12-bed rest ward, Fig. 20, is maintained to provide temporary bed care to those employees presenting dysmenorrhea, those recovering from minor surgical procedures, or those needing such therapeutic measures as compresses or irrigations, and in some instances serves as a temporary haven for those in the early stages of pregnancy. Hot liquids are available, and in a quiet, restful and attractive atmosphere, an employee can secure an hour or so of rest and return to the job feeling better, and no longer in need of going home for the temporary discomfort of the symptoms.

Insufficient use is made of rest ward facilities throughout the Port—not through absence of medical advice in regard to such usage, but female employees do not present themselves for this temporary bed care for dysmenorrhea, preferring to take one to two days off when the condition is present. The reticence on the part of the worker to make the condition known outweighs the desire for alleviation from pain, and so the worker prefers to remain at home. Those women who take time consistently from work because of menstrual disorders are referred to us on request, and an effort is made to determine the pathological or functional cause for this absence. Rest ward care is substituted, plus therapeutic advice, and the worker will put in a full month without time loss. In agreement with MRS. WARWICK B. HOBART, adviser on the employment of women to the Director of Civilian Personnel, Office of the Secretary of War,* dysmenorrhea as a disabling entity is more pronounced in office workers than in those women serving as welders, machinist helpers or electricians, engaged in actual ship or shop activities.

A fair-sized group of women employees coursing the turbulent days of the climacteric will be given parenteral estrogenic therapy provided full directions are presented from the private physician, if he desires this form of therapy, such as the name of the drug, dosage, frequency of injection, and duration of treatment. In this manner, a 15-minute visit to the industrial nurse obviates a half-day lost time in visiting a downtown practitioner; the procedure is characterized by its accomplishment with the complete cooperation of the family physician. This practice can, with ease, veer into the promiscuous giving of parenteral therapy or prophylaxis — to avoid this, the feeling of the medical department in regard to the value of respiratory vaccines is expressed to all interested, and thus their use is discouraged. It is to be stressed that it is not the aim or scope of the Army Industrial Medical Program to offer its medical service when it should be rendered by civilian physicians of the community.

Health Promotion

CONCURRING completely in thought with Hazard[21] that adults are irritated with the phrase "worker health education" all attempts have been made to stress the

*Comments on paper by C. O. SAPPINGTON, M.D., DR. P.H., on "Health Problems of Women in Industry," Proceedings of Eighth Annual Meeting of Industrial Hygiene Foundation of America, November 10-11, 1943.

THE CORYLLOS THORACOSCOPE

WITH SELF-CONTAINED CAUTERY TRANSFORMER AND LIGHT SOURCE

In presenting this improved instrument to the profession, acknowledgment is made to the work of Jacobaeus, Unverricht, Kremer and others, whose technique and instruments have been modified to suit the needs of the thoracic surgeons of this country.

Made in America, exclusively of American materials, by American workmen, the Coryllos Thoracoscope is distinguished by its many unique features, a few of which are described below:

★ Cautery electrodes have an extra sturdy platinum tip, which will not bend when hot or cold, and is shaped particularly for cold blunt dissection.

★ Self-contained shock-proof transformer constructed especially for the exacting requirements of thoracic work.

★ Foroblique* telescope resulting in complete elimination of lamp obstruction of the field of vision.

★ Footswitch control permits free use of operator's hands for manipulation of electrodes and telescope.

Consult your Surgical Supply Dealer or write for descriptive booklet including technique of the late Pol N. Coryllos.

ESTABLISHED IN 1900 BY REINHOLD H. WAPPLER.

AMERICAN CYSTOSCOPE MAKERS, INC.

FREDERICK C. WAPPLER, PRESIDENT

1301 LAFAYETTE AVENUE NEW YORK CITY

*Foroblique is our registered trade-mark to designate our obliquely forward telescopic system.

value of health knowledge without having it smack of the pedagogic approach. Workers resist all carriers of banners who try either to influence them or to make them do something "that's good for them." The point is made at all times that the state of health is a positive entity, something to be acquired, and not merely the absence of disease. One, therefore, has something to work toward—a realization of having developed a feeling of well-being. The goal of a negative concept is nothing to be attained, hence the value of being able to promise *something* as a reward for proper prophylactic health practices.

As it is the child who is the more impressionable, so it is the worker new in the field. He who is just learning a trade and has not yet absorbed the erroneous conceptions and fears of the job imbedded through years of tradition, can learn the correct approach to the health aspects of the occupation. He can be told the dangers of certain exposures, and of the preventive measures that will protect him against the uncontrolled hazards. Applying this principle, talks have been given all new classes in crafts training wherein the trainees, mostly women far afield from previous occupations, are told of the dangers of solvents, of inappropriate dress, and of the lack of personal hygiene. In addition, the changes undergone by women entering industry are delineated and the problems of the menses, of pregnancy and venereal disease are discussed. The transformation of the groups of embarrassed and giggling females to thoroughly interested and information-seeking students is a revelation. Peculiarly enough, many of the questions presented are in regard to personal symptoms. Several who have been told to report to the Port Dispensary for consultation on these complaints, have been extremely grateful for the help. The trainees enter regular job assignments with a respect for and an eagerness to maintain good occupational health.

From this point on they are subjected to a constant bombardment of health bulletins, mimeographed pages of pertinent health messages of contemporary value, or descriptive of new medical facilities available to them. These bulletins, which may be seen in Figs. 27A and B, appear semi-monthly, and it has been gratifying to learn that, if distribution is limited, many employees telephone for additional copies.

Paralleling the bulletins, with more vivid illustrative material, are the Industrial Medical Posters produced in black and white, which, through a brief play on words, a striking illustration or attention getting lettering, drive home the thought desired. Posters have been used to explain the chest survey, to describe new dispensaries opening, to warn the worker of immediate care for injuries, and some of the slogans and thematic material used are briefly:

ARMY SERVICE FORCES PORT OF EMBARKATION

15 June 1944

INDUSTRIAL MEDICAL OFFICE
HEALTH BULLETIN

NO. 17

MIDDAY MORALE BUILDER

What's in *your* lunch box today- There are lots of possibilities, you know; that little tin box can be a treasure house of food values—or a load of digestive dynamite!

* *

The pressure of war-time activity in industry has made many people aware of facts they considered too unimportant to worry about before. Example- Well, the midday meal, for one thing. Everyone used to take it for granted that there would be an "afternoon slump" in the production curve, that you and I would just naturally start to yawn, to slide farther down into our chairs, and to break up the overall "rhythm" of our work, within an hour or two after lunch.

* *

The heads of industries figured it wasn't worth while worrying since nothing could be done about "laziness," and besides, it couldn't make too much difference, after all!

* *

BUT THEY WERE WRONG! Statistics show that a tremendous number of man hours are lost by that lull in mid-afternoon and lost man hours mean lost production and a longer war! And those figures pointed the way to an even more important fact—that this loss is due to decreased energy, to a slowing down of activity on the part of the workers.

* *

That decrease in energy is directly due, in many cases, to an inadequate lunch, a meal that either overloads your poor stomach, or starves it. In both cases, you're giving that complex machine, your body, an unfair job, and it rebels by letting you down when you need it most.

* *

The contents of your lunch box should be planned with the same care that you put into the planning of a dinner party, or the rigging of a fuel line. Food is fuel, you know; if it isn't the best quality, that machine won't run properly.

* *

This will give you an idea of what you should have in your lunch box, and it all adds up to about one-third of the day's food essentials. There should be fats and carbohydrates for fuel and energy; high quality protein like milk, cheese, eggs, fish, or meat; those invaluable fruits and vegetables for your vitamins and minerals, as well as for sugar and some protein. Your body tissues need food for growth and repair, for the constant flow of energy that you need to feel cheerful and able to do your day's work efficiently and steadily.

* *

NOW TURN THE PAGE and run your eye over a few suggestions for that midday morale builder—your lunch box! Treat your stomach well—you need its cooperation!

HIS LUNCH BOX	*HER LUNCH BOX*
(1) 2 cheese sandwiches on wholewheat bread	(1) 1 cheese sandwich on wholewheat bread
(2) 1 meat sandwich	(2) 1 jelly and peanut butter sandwich
(3) Thermos of hot soup or milk	(3) Lettuce wrapped in waxed paper
(4) Salad (in a jar)	(4) Thermos of milk
(5) 2 pieces of fruit	(5) Cookies
(6) Cookies	(6) One piece of fruit

* * * *

Here are some lunchbox suggestions that you will enjoy:

(The first ingredient listed is the main sandwich filling; add the others to taste).

(1) Ham—mustard, mayonnaise, cheese, horseradish.
(2) Tongue—lemon, horseradish.
(3) Canned fish (tuna, salmon)—lemon, vinegar or pickles and olives, salad dressing, chopped eggs, onions.
(4) Chicken—celery or apple.
(5) Cream cheese—nuts, olives, fruit, or salad dressing, roquefort cheese.
(6) Chopped cooked tongue—seasoning and a little liquid, to taste, sliced tomato.
(7) Baked beans with relish, on wholewheat bread.

A thermos bottle will keep cocoa or soup hot for 24 hours! If no milk is served, be sure to have it in *some* form in every lunchbox—custard, chocolate pudding, etc.

A final word—the better it looks, the better it tastes! Plenty of crisp lettuce, a well-moistened, but never soggy, sandwich filling, little extra surprises wrapped in waxed paper and tucked into corners—all these help to make the lunch hour a time of relaxation, enjoyment, and benefit.

DISTRIBUTION: All civilian employees.

Fig. 27A.
Health Bulletin

ARMY SERVICE FORCES PORT OF EMBARKATION

21 July 1944

INDUSTRIAL MEDICAL OFFICE
HEALTH BULLETIN

NO. 18

X-RAY WILL TELL YOU!

Tuberculosis is a lodger that moves right in and makes itself at home long before you have an inkling of its presence. By the time you *feel* sick—sick enough to worry—those germs have set up housekeeping on a grand scale, and it is a real battle to dislodge them. That is why early detection, early diagnosis, play a leading role in the control of tuberculosis.

There are several ways of "spotting the spots," or the infected areas, of the lungs; the physical examination, in the course of which the doctor listens for certain characteristic chest sounds; the tuberculin test, in which a raised red spot indicates infection; the sputum test, by means of which the microscope identifies the tuberculosis germs; and, best of all, X-RAY PICTURES OF THE CHEST, which *mark* the spot *in* the lung.

X-ray studies of the chest will show the early areas of infection even *before* the need for the other tests has been manifested. X-ray pictures are a *precautionary* health measure—they mean that you are making certain you are well!

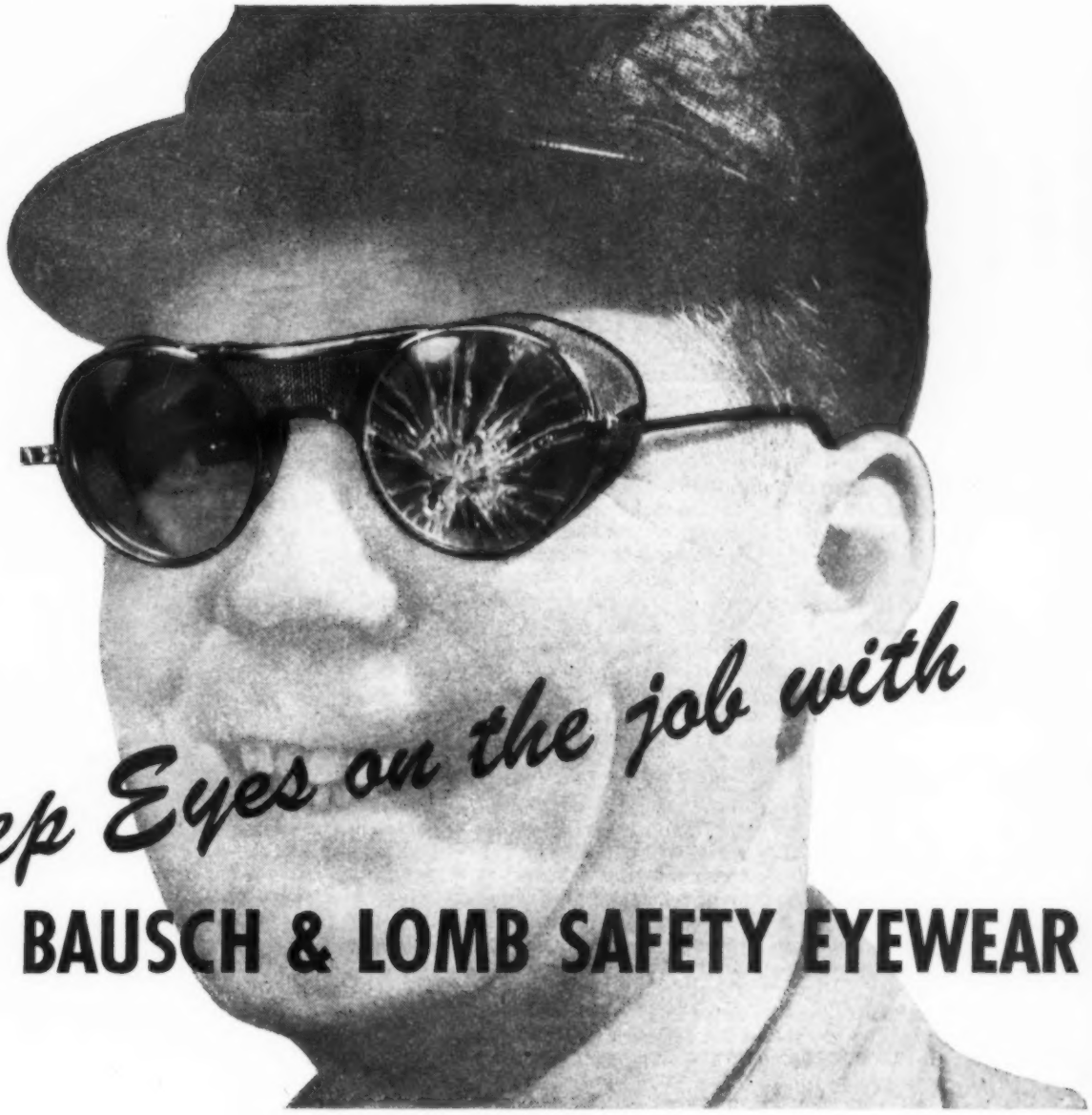
Arrangements have been made, through the facilities of the Industrial Medical Program, for the taking of chest x-ray pictures of civilian employees throughout the Port of Embarkation, starting 10 July. This will not include those workers whose employment began on or after 1 June, 1944, when the chest x-ray was adopted as a routine part of the pre-placement physical examination. Every civilian employee will receive a slip from his supervisor, indicating the date and hour at which he is to report to the Station Dispensary, Building 240, for his chest x-ray. This is a service offered without cost to you, for the protection of the individual worker, and to safeguard the community at large. Each and every precautionary health measure of this sort means the assurance of protection not only to the individual, but also to his fellow-workers and to his family.

DISTRIBUTION: All Civilian Employees.

Fig. 27B.
Health Bulletin

TABLE 12.
SUBJECTS OF HEALTH POSTERS

"If the Shoe Fits, Wear It"	Wearing of appropriate shoes.
"Eat Right, Prevent This Bite"	Eating of basic food.
"The Eyes Have It"	Wearing of safety glasses.
"Do Not Spit"	Avoidance of expectoration.
"Don't Waste"	Campaign against food waste.
"Block That Cold"	Preventive measures against the common cold.
"Protect the Men Who Protect You"	Red Cross Blood Procurement.
"Every Injury Needs Attention"	Care of minor injuries.
"Why X-ray?"	Chest survey.



Keep Eyes on the job with

BAUSCH & LOMB SAFETY EYEWEAR

In more ways than one Bausch & Lomb Safety Eyewear helps to keep workers' eyes on the job!

Employees' eyes are safer behind *carefully selected* and *carefully fitted* safety glasses. With comfortable, efficient, safe vision these men and women are better workers . . . able to concentrate on the job all day long.

Tough, strong safety lenses to resist blows from flying objects and lenses that protect against injurious light keep the eye accident toll down . . . prevent the lay-offs and lost time that are the extra costs of unprotected vision.

Whatever hazards exist in your plant, whatever the visual requirements of the individual worker, the eyes of each employee can be protected with safety eyewear . . . metal spectacle type or molded cup goggle . . . from the complete Bausch & Lomb line. For your employees who wear glasses for eyesight correction there are B&L prescription-ground safety lenses (single vision or bi-focal) professionally prescribed for the visual requirements of the job. Write for complete information. Bausch & Lomb Optical Co., 602 St. Paul St., Rochester 2, N. Y.

B L *All B&L Safety Lenses now in production will be marked with this trademark . . . recognized as the symbol of the highest quality in optical products.*

BAUSCH & LOMB

B&L

Safety Eyewear

Fig. 28.
Industrial Health News Bulletin Board

The posters are distributed throughout the port facilities and are placed on special bulletin boards headed "Industrial Health News" (Fig. 28) each holding two posters, and are located strategically near other bulletin boards, time clocks, vending machines, lobbies, etc. Interest is manifested in this portion of the health promotion program, as a poster developed on "Spitting" resulted from a prize-winning suggestion submitted through the Suggestion Box system. Frequent changes of these broadsides are made as it long has been learned that, like the mother with the cross-eyed child, the worker no longer sees something that fuses into his everyday environment. Constant changes and a fresh approach attract attention and waken dulled visual sensitivities (Fig. 29).

Health pamphlet racks have been placed in all dispensaries, and are provided with booklets made available by the larger insurance companies, manufacturing associations, and food councils. It is regretted that no true yardstick exists by which one can estimate the value of this distribution. The material disappears, and replenishment is constant, so some of the messages must reach home. Fortunately these brochures are more than waiting room time passers. It cannot be stressed too strongly that those commercial agencies making these publications available are unceasing in their generosity, and no request seems beyond compliance. Those limiting factors of printing and paper in the War Department are well made up for by these business groups.

All surveys conducted are well papered with booklets on the value of the chest plate or blood test, and no opportunity is lost to spread explanatory data relative to the survey in which John Doe, the worker, is partaking. He is entitled to know why the study is being made, and what the blood test means. It is totally unfair to herd in groups of people, and subject them to discomforting medical procedures, without enlightening them as to the rationale of it all. The public has been pitched very acutely to things medical by the digest publications, and is sufficiently appreciative of therapeutic advances to deserve some explanation. Every request for an examination is accompanied by some reasoning on paper, so the worker is subjected actually and subconsciously to health information.

The Camp papers offer another medium of disbursement of information, and strong articles in a conversational and popular vein are submitted for publication. These are of contemporary value and parallel the health need at the moment. As an example, a high number of rejects at the Red Cross Blood Donor Center resulted in an article and talks on "Better Breakfasts," "The Full Lunch Box," etc. All health publicity is under the charge of the Director of Health Promotion who prepares the bulletins, the ideas for posters, and the columns for the service publications. Three dimensional displays of health and safety materials are under the jurisdiction of this member of the program, and constant liaison between the worker groups and the Industrial Medical Section is maintained so that a chronic sampling is ever available to guide the course in health instruction.

Nutrition Service

SERVING in an advisory capacity, the nutritionist on the staff of the Industrial Medical Section provides accurate dietetic information to those individuals on restricted or special diets. Advice on the broader aspects of nutrition as it relates to the health of the worker, or to the woman employee who has recently made a change from a sedentary occupation to a craft, or in connection with present marketing problems, is given either to workers individually who request such information or to groups in brief conference form. The nutritionist is responsible also for the preparation of those health bulletins relating to foods and such posters as may be published in this field.

Active liaison with the cafeteria has been attempted but with not too much success, as the conversion of the established eating centers catering to both military and civilian personnel to the counter-part of an industrial in-plant feeding service has not proved desirable from the military point of view. With casual personnel awaiting shipment overseas at the Port, very frequently accompanied up to the last minute by their families, a strictly two-choice luncheon or dinner would not be practicable. Branches of the Post Exchange are located at several of the Port installations and provide either full meals or fill-in pastry and fruit dishes.

At the present time lunchroom facilities are being built at all piers in order to provide comfortable enclosures wherein the dockseamen, longshoremen and other pier personnel may eat, if they bring their own lunches. These will serve in good stead in a place where, at best, the wind and rain swept open area of a pier shed does not prove inviting or comfortable for mealtime purposes.

Courses have been given to food handlers in the basic sanitary requirements of their job and, through demon-

Figs. 29A, B, and C. Posters

Habits CAN Be Changed . . . Physiologic Reactions Cannot

During the recent years of intensified industrial effort much new knowledge has been gained of the relation between the worker's eating habits, his state of nutrition, his work efficacy, his stamina, and his "staying power." Critical studies of work output, acuity, and accident incidence, have shed new light on the importance of an adequate breakfast to enable the worker to go through the morning hours without lessened efficiency, without premature fatigue, without diminished attention to safety factors.

The skimpy or skipped breakfast is strictly a matter of habit. The physiologic reactions to the extended fast engendered by going without breakfast cannot be prevented. But habits can be changed by sound, friendly reasoning and advice.

A good plan—in the aim toward changing this wrong eating habit—is to advise starting with a simple, quickly prepared, yet nourishing morning meal — one consisting of fruit, cereal (ready to eat or to be cooked), milk, bread and butter, and a beverage. As habituation to eating a proper breakfast develops, the sense of well-being during the morning hours improves also, and breakfast becomes an appreciated, looked-forward-to meal. The pattern breakfast is easily augmented by the addition of eggs or other suitable foods, when more nutriment is required.

What the dish, composed of 1 oz. of cereal (whole grain, enriched, or restored to whole-grain values of thiamine, niacin, and iron), 4 oz. of milk, and 1 teaspoonful of sugar, contributes nutritionally is shown in the appended table of composite averages:

Calories	202
Protein	7.1 Gm.
Fat	5.0 Gm.
Carbohydrate	33 Gm.
Calcium	156 mg.
Phosphorus	206 mg.
Iron	1.6 mg.
Thiamine	0.17 mg.
Riboflavin	0.24 mg.
Niacin	1.4 mg.

The presence of this seal indicates that all nutritional statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

CEREAL INSTITUTE, INC.
135 SOUTH LA SALLE STREET • CHICAGO 3

strations of bacterial contamination on culture media, the showing of films, etc., cooks, waitresses and bus girls learn the elementary sanitation required.

The ideal situation at a plant of port size would be the serving of the nutrition consultant as a combined nutritionist-dietician, where active manning of the plant cafeterias could be accomplished by the individual who has the knowledge of the food requirements of the employee's industrial existence. Private industry can, through partial absorption of cafeteria costs, provide meals to the workers of adequate nutritive value at low cost. This procedure is not possible in War Department establishments where operating regulations preclude this cost-share method.

Sanitation

SINCE the inception of the program, constant surveys have been carried on in order to determine the existing deficiencies in the sanitary facilities of the work areas, to include:

TABLE 13. SANITARY FACILITIES SURVEYED

Drinking water facilities.
Illumination of office areas.
Locker space.
Lunch room areas.
Retiring areas.
Toilet facilities.
Ventilation of office areas.
Washing facilities (basins, soap dispensers, towels, waste receptacles, etc.)

The form seen in Fig 30 is used by the inspecting officer, and such engineering changes as may be effected following the recommendations are noted on the reverse of the card.

Standards that are followed are those of the U. S. Public Health Service,[9] American Standards Association, and, in new construction, War Department Engineers Manual.[22] It is attempted in all instances to have the facilities match the accepted standards, with such minor variations as may be determined by the type or number of the working group.

All rest rooms are under the supervision of matrons, a proviso established by the War Department,[23] and, in those work sections where lounge space is not available, acquaintance with the locations of various rest ward facilities is made. It has been of interest in bringing the sanitation of the Port up to modern standards, in that practically all of the piers were equipped with dark and totally inadequate aged washrooms, originally built 30 to 35 years ago to provide washing facilities for the few employees of a relatively inactive peace-time port. With mushroom growth of an active embarkation point, plumbing had to be increased to care for the rapidly increasing size of the civilian population. As it is, there are still some rest areas mal-located, but they are serving their purpose. The Army has in many instances leased privately owned properties all of which were inadequately equipped as to hygienic appliances, thus necessitating al-

137 (rev.)

INDUSTRIAL SANITARY SURVEY

POST	DIVISION						BLDG. NAME OR NO.					
TYPE OF ACTIVITY							FLOORS				ELEVATORS	
TOTAL NO. OF EMPLOYEES	1st SHIFT		M		F		2nd SHIFT		M		3rd SHIFT	M		F	
TYPES OF OCCUPATION	M	F	TYPES OF OCCUPATION						M	F	REMARKS				
LOCATION															
FACILITIES	M	F	M	F	M	F	M	F	M	F	M	F			
DRINKING FOUNTAINS															
HAND CLEANSERS															
HOT WATER SUPPLY															
JANITOR CLOSETS															
LOCKERS															
MIRRORS															
SANITARY PAD DISPENSER															
SANITARY PAD RECEPTACLE															
SOAP DISPENSER															
TOILETS															
TOILET PAPER HOLDERS															
TOWEL BOXES															
URINALS															
WASH BASINS															
WASTE RECEPTACLES															

OCCUPATIONAL HAZARDS

COMMERCIAL PRODUCTS	MANUFACTURER
HEATING	ILLUMINATION

VENTILATION

Fig. 30. Industrial Sanitary Survey Form

Logically

. . . You'll want to eliminate outmoded technics and equipment with

POUR-O-VAC SEALS

the modern, reusable hermetic closure for sealing, storing, handling and conserving surgical fluids.

THESE FACTS ARE CONVINCING . . .

Pour-o-vac Seals eliminate the possibility of sterile water contamination caused by intake of bacteria-laden dust . . . avoids contamination by unfiltered air.

They serve a secondary function of providing a dustproof seal for remaining fluid when only the partial contents of a container are used. Of importance, they are interchangeable with all Fenwal 3000, 2000, 1000 and 500 ml. containers.

In permitting contents to be stored for long periods under vacuum . . . periodic testing for sterility without breaking the hermetic seal . . . pouring of contents from a non-drip sterile lip, Pour-o-vac seals eliminate the wasteful, time-consuming and questionably scientific method of sealing with gauze, cotton, paper, string and tape.

ALSO INVESTIGATE—Fenwal Automatic Washing Units, capable of accommodating and thoroughly cleansing 4 containers in 30 seconds.

HEADQUARTERS FOR SCIENTIFIC GLASS BLOWING, LABORATORY AND CLINICAL RESEARCH APPARATUS, REAGENT CHEMICALS

ORDER TODAY or write immediately for further information

Fenwal

MACALASTER BICKNELL COMPANY

243 Broadway Cambridge, Massachusetts

most complete revision of the sanitary facilities. There is no question as to the morale factors involved, when women workers do not find on the job the ordinary rest rooms of any theater or large department store, to which they are so accustomed in their off duty hours. The general caliber of work and interest in the job have improved with the offering of proper facilities. This is of particular value in connection with the areas or buildings used in training workers, either crafts or clerical, because it is in the early period of government employment that impressions are strongest, so that if the groups are satisfied from the beginning the labor turnover can be minimized.

Occupational Health Hazards

THE Army Industrial Hygiene Laboratory surveys army industrial installations as to environmental hygiene and provides medical and engineering consultation to control occupational health hazards, on request of the installation commander. A preliminary survey team is sent from the Laboratory to spot, as it were, those areas or industrial processes where detailed studies of potential or real health hazards must be conducted. Within a short time, a follow-up team of industrial hygiene engineers measures the exact hazards by collecting samples of noxious dusts, vapors and fumes, or doing on the job determinations of such exposures as carbon monoxide or inadequate illumination. Control measures in the form of exhaust ventilation systems are then recommended and installation of these systems is completed when practicable. This type of service has been given the Port of Embarkation, and an accurate isolation of the existing hazards has been accomplished. Although a port does not have the many manufacturing processes of arsenals and government contract plants, the several activities in connection with ship maintenance and repair, auto and truck maintenance, and the post engineer's construction, do present certain hazards requiring control in addition to certain industrial procedures productive of "nuisance" elements.

In the main, the following exposures are present in installations throughout the port of embarkation:

TABLE 14.
OCCUPATIONAL HEALTH EXPOSURES IN A PORT OF EMBARKATION

Ship Repair and Maintenance:	
	Welding fumes, nitric oxides, lead fumes, zinc fumes, fluorides, wood dust, perchlorethylene, carbon tetrachloride, paints, oil, solvents, paint mists, hydrochloric acid, carbon monoxide, dust (forge), sulfur dioxide, freon, paint thinners, nuisance dusts, silica.
Vehicle Maintenance and Processing:	
	Carbon monoxide, paint mists, solvent vapors, petroleum solvents, welding fumes, chlorinate hydrocarbons, wood dust, rust preventives.
Disinfestation:	
	Methylbromide.
Post Maintenance Activities:	
	Wood dust, paint mists, solvent vapors.
Pier Shipping Activities:	
	Carbon monoxide.
Supply Activities:	
	Sulfuric acid mists, petroleum, solvents, oil mists, carbon tetrachloride, gasoline vapors.
Office Buildings:	
	Inadequate illumination, glare, noise.

In those exposures wherein control is recommended, appropriate personal protective devices or adequate exhaust ventilation will be installed. Protective creams and non-abrasive hand cleansers will be substituted for non-accepted creams and mechanics' soaps. As the Army Industrial Medical Program is comparatively new at the embarkation ports, rigid industrial hygiene control has not been exercised, although fortunately no mortalities have resulted from the industrial exposures and the morbidity has been low.

The services of the Army Industrial Hygiene Laboratory are always available for consultation, and samples of new commercial products used can be forwarded for analyses, or collected gases, fumes, etc., can be referred for quantitative determination. In this manner, with constant survey procedures in progress, new industrial processes can be installed effectively from the start of the activity. The services of the Laboratory are invaluable, particularly in those military installations where industrial hygiene engineers are not part of the permanent personnel, being in the rare specialty category.

Records

THE records employed in the program are those which will allow accurate statistical evaluation, and which, when consulted at periodic intervals, are sufficiently complete to be of value in any future reference requirement that may arise. There is an active publications control program in the Army, and every effort has been made to streamline blank forms and reports; the development of report forms in the industrial program has attempted to parallel the philosophy adopted throughout the Port. In the main Port Dispensary a printed manila folder serves as the clinical record, the cover of which has spaces providing for the entry of identifying information (Fig. 31) and the back of the cover serves as a diagnostic record (Fig. 32). An attached label on the folder tab provides the name and number of the chart. This number is based on the last two digits of the year, that is, charts used in 1944 will be numbered 44-1 to 44-10103, etc. Loose leaf sheets which are placed in the folder serve as the follow-up record of the patient concerned. In all cases of an industrial accident sustained by a civilian employee, the form "Medical Report of Civilian Industrial Accident" is completed and forwarded to the Port Accident Prevention Branch and the Claims and Compensation Branch of Civilian Personnel. Sufficient information may be derived

CLINICAL RECORD

NAME (*Last, First, Middle Initial*)

MILITARY PERSONNEL

A.S.N.	GRADE	BRANCH	SECTION
PLACE OF BIRTH (*City, State*)			DATE OF BIRTH
YEARS IN SERVICE	☐ PERMANENT ☐ CASUAL	DATE OF FIRST VISIT	

CIVILIAN PERSONNEL

SECTION		POSITION
☐ PERMANENT	☐ CASUAL	DATE OF FIRST VISIT

CIVILIAN DEPENDENT

DEPENDENT OF (*Full Name*)

RELATIONSHIP — DATE OF FIRST VISIT

AGE	SEX	MARITAL STATUS	RACE
	F ☐ M ☐	S ☐ M ☐ D ☐ W ☐	W ☐ C ☐ B ☐ Y ☐

HOME ADDRESS (*Street, City, State*)	HOME PHONE
OFFICE ADDRESS	OFFICE PHONE
NEAREST OF KIN (*Full Name*)	RELATIONSHIP
ADDRESS OF NEAREST OF KIN (*Street, City, State*)	PHONE NUMBER

Fig. 31.
Cover of Clinical Record (front)

DIAGNOSTIC RECORD*

DATE	DIAGNOSIS	M.O.

* All diagnoses entered hereon will conform to standard terms for diagnoses as outlined in AR 40-1025 and modifying pamphlets. For clarification, more commonly used diagnostic terms may be placed in parenthesis following the initial entry.

Fig. 32.
Cover of Clinical Record (reverse)

CAL-C-TOSE 'ROCHE'

. . . makes a tempting beverage when mixed with hot or cold milk, supplying ample amounts of vitamins A, B_1, B_2, C and D, as well as calcium and phosphorus. Its delicious chocolate flavor carries no suggestion of medication. 12-oz and 5-lb containers.

VITAMINETS 'ROCHE'

. . . provides 9 vitamins and 5 minerals in a pleasant-flavored tablet which is readily acceptable to children and adults—a tablet with a licorice flavor so palatable that it may be chewed. Bottles of 30, 100 and 250.

VI-PENTA DROPS 'ROCHE'

. . . an easy-to-take, non-alcoholic multivitamin preparation with liberal amounts of vitamins A, B_1, B_2, C, D, and niacinamide. 15-cc vials and 60-cc packages.

HOFFMANN-LA ROCHE, INC., NUTLEY 10, N. J.

CHART NUMBER

Date of Injury ..... Hour ..... Date of First Visit ..... Hour .....

MEDICAL REPORT OF CIVILIAN INDUSTRIAL ACCIDENT

Last Name | First | Initial | Age | Address | Phone

Race | Occupation | Years at Occupation | Badge Number

Where Working | Employer | Foreman

HISTORY

1. COMPLAINT
2. WHAT INJURED WAS DOING AT TIME
3. HOW INJURY OCCURRED
4. CAUSE
5. WHAT SHOULD HAVE BEEN DONE TO PREVENT ACCIDENT (Opinion of Patient)
6. WITNESS

COMPENSATION FORMS COMPLETED

CA-2 ..... CA-4 .....

CA-8 .....

OTHER .....

DISPOSITION

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

D—Duty Q—Quarters LD—Light Duty H—Hospital

DISCHARGE NOTE

DATE OF DISCHARGE ..... No. TREATMENTS ..... No. DAYS LOST .....

FINAL DIAGNOSIS

CONDITION ON DISCHARGE

M. C.

Fig. 33.
Medical Report of Civilian Industrial Accident (front)

FIRST VISIT MEDICAL REPORT

MEDICAL OFFICER'S HISTORY

EXAMINATION

X-RAY FINDINGS

FILM NUMBER .....

DIAGNOSIS

TENTATIVE (If not of industrial origin, explain)

FINAL

DIAGNOSIS CODE ..... TOPOGRAPHIC CODE .....

TREATMENT

DISPOSITION | Regular Duty ☐ | Light Duty ☐ | Quarters ☐ | Marine Hosp. ☐ | M.H. Out-Pat. ☐ | with Form CA-16 ☐ | with Form CA-17 ☐ | TO RETURN ..... DAYS

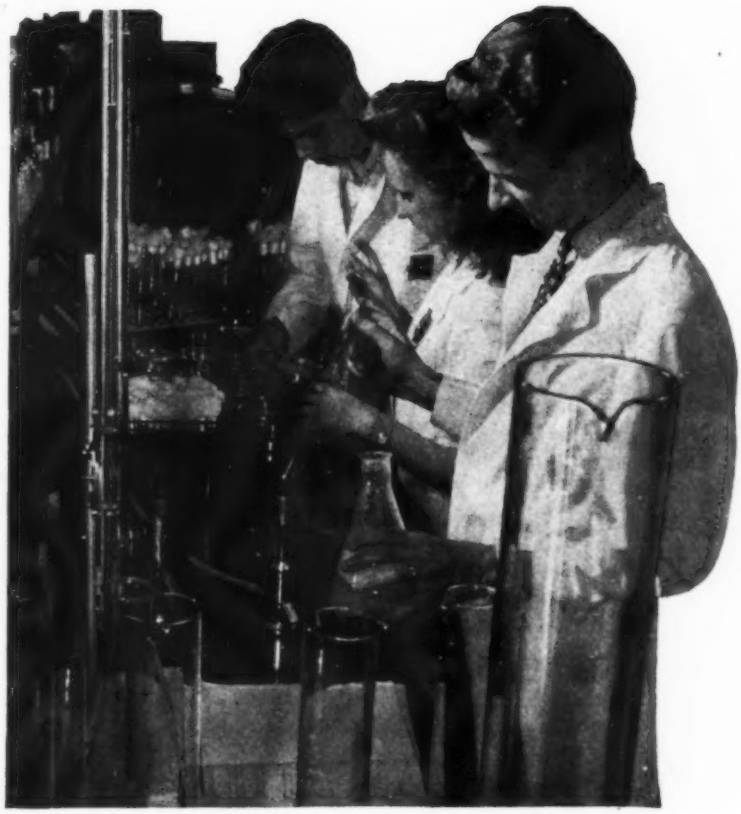
PROGNOSIS

Estimated Time of Disability .....

Date of Report .....

M. C.

Fig. 34.
Medical Report of Civilian Industrial Accident (reverse)



MERCK VITAMINS

Thiamine Hydrochloride U.S.P.
(Vitamin B_1 Hydrochloride)

Riboflavin U.S.P.
(Vitamin B_2)

Niacin
(Nicotinic Acid U.S.P.)

Niacinamide
(Nicotinamide U.S.P.)

Pyridoxine Hydrochloride
(Vitamin B_6 Hydrochloride)

Calcium Pantothenate Dextrorotatory

Ascorbic Acid U.S.P.
(Vitamin C)

Vitamin K_1
(2-Methyl-3-Phytyl-1,4-Naphthoquinone)

Menadione U.S.P.
(2-Methyl-1,4-Naphthoquinone)
(Vitamin K Active)

Alpha-Tocopherol
(Vitamin E)

Alpha-Tocopherol Acetate

Biotin

PURE VITAMINS

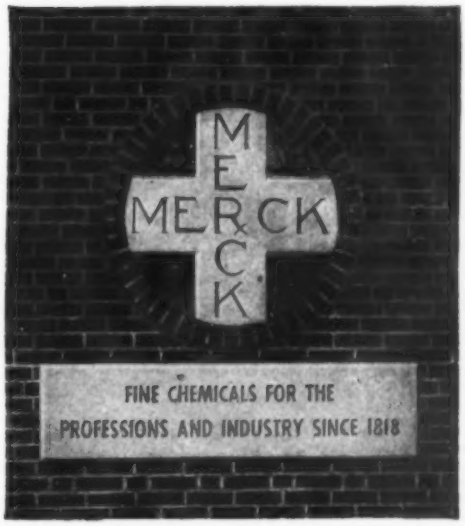
—products of Merck Research

Merck & Co., Inc. now manufactures all the vitamins commercially available in pure form, with the exception of vitamins A and D.

Merck research has been directly responsible for many important contributions to the synthesis, development, and large-scale production of individual vitamin factors in pure form.

In a number of instances, the pure vitamins may be considered to be products of Merck research. Several were originally synthesized in the Merck Research Laboratories, and others have been synthesized by Merck chemists and collaborators in associated laboratories.

Because most of the known vitamins have now been made available in pure form, effective therapy of specific vitamin deficiencies can be conducted on a rational and controlled basis, under the direction of the physician.



BUY and HOLD U. S. Savings Bonds for Security

MERCK & CO., Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

from these forms to allow definite accident investigation and a complete record of the patient's progress is available at a glance (Figs. 33 and 34).

As may be noted, spaces are provided showing the status of completion of certain compensation forms. The importance of accurate industrial accident report forms cannot be emphasized too strongly, in view of the concerted effort on the part of the War Department to minimize the number of accidents sustained in industry by both civilian and military personnel. This accident prevention program is an extremely energetic one and it is felt that, through accident reports and good medical care, absenteeism may be cut.

Other record forms employed are, specifically, a card

DIM-2

ARMY SERVICE FORCES
PORT OF EMBARKATION

DATE:
SECTION:

CIVILIAN EMPLOYEES MEDICAL CARE
DAILY AND MONTHLY REPORT

NON-TRAUMATIC CONDITIONS CLASSIFICATION	DAILY TALLY
ADVISORY SERVICES	
CARDIOVASCULAR DISEASE	
DERMATOSES (NON-OCCUPATIONAL)	
EAR DISEASE (NON-RESPIRATORY)	
EYE DISEASE (NON-RESPIRATORY)	
GASTRO-INTESTINAL DISEASE	
GENITO-URINARY DISEASE (EXCEPT V.D.)	
HEADACHES	
MENSTRUAL DISORDERS	
NERVOUS AND MENTAL STATES	
NEURITIS	
NEW GROWTHS (INCLUDING CANCER)	
ORTHOPEDIC DISEASE	
PYOGENIC INFECTIONS	
RESPIRATORY DISEASE	
THERMAL STATES	
TOOTHACHE	
T.B. (ACTIVE & INACTIVE)	
VENEREAL DISEASE	
MISCELLANEOUS	

TRAUMATIC CONDITIONS CLASSIFICATION	DAILY TALLY
ABRASIONS	
AMPUTATIONS	
BURNS	
CONTUSIONS	
DISLOCATIONS	
FRACTURES	
FRICTION INJURIES	
FOREIGN BODIES	
HERNIAE	
INFECTIONS (SECONDARY)	
LACERATIONS	
ORTHOPEDIC SEQUELAE	
PUNCTURE WOUNDS	
SPRAINS & STRAINS	
MISCELLANEOUS	

PARTS INJURED	DAILY TALLY
ABDOMEN	
ARMS	
BACK	
CHEST	
EYE	
FEET	
HANDS	
HEAD	
LEGS	

DISPOSITION CLASSIFICATION	
DISPENSARY VISIT	
REST WARD	
HOSPITAL (Civilian or Army)	
HOME (Quarters)	
REFERRED TO PRIVATE PHYSICIAN	
MARINE HOSPITAL	
REFERRED TO PRIVATE DENTIST	

MISCELLANEOUS CLASSIFICATION	
FIRST VISITS Occupational Cases	
FIRST VISITS Non-Occupational Cases	
REPEAT VISITS Occupational Cases	
REPEAT VISITS Non-Occupational Cases	
IMMUNIZATIONS	
PHYS. EXAMS, Pre-placement	
PHYS. EXAMS, Periodic	

DAILY TOTAL
NON-TRAUMATIC
TRAUMATIC
DISPOSITION
HOSP:
WARD:
DISP:
HOME:

OCCUPATIONAL HAZARDS
ABNORMALITIES OF AIR PRESSURE
ABNORMALITIES OF TEMPERATURE & HUMIDITY
DAMPNESS
DEFECTIVE ILLUMINATION
DUST
INFECTIONS
RADIANT ENERGY
REPEATED MOTION, PRESSURE, SHOCK, ETC.
POISONS
INDUSTRIAL DERMATOSES

PORT INDUSTRIAL MEDICAL PROGRAM

Fig. 35.
Civilian Employees Medical Care, Daily and Monthly Report

GAUZTEX *saves time and keeps men* ON THE JOB!

Gauztex is white surgical gauze treated so that it sticks to itself, but *only* to itself—never sticks to skin, hair or clothing.

No other tapes, pins or tying are necessary. Bandaging is done in a fraction of the time. Men are returned to the job much quicker and since the gauze sticks to itself less material is needed and bandage lasts longer. Dressings are quickly, easily prepared and applied, and removed without pulling skin or hair and with minimum disturbance of wound. Leaves no gum or other stains. The special treatment leaves the gauze porous, permitting free entrance of air.

Oil Resistant Gauztex will not come off in oil, gasoline, naphtha or water. It is white, soft, pliable, dry, porous, cohesive and guaranteed to remain cohesive. Gauztex is widely used by the profession in private practice and in industrial practice where hundreds of thousands of rolls are used annually.

Chrysler, International Harvester, Studebaker, the various aircraft plants and thousands of factories in nearly every industry are all regular users. Manufactured only by General Bandages, Inc., 531 Plymouth Court, Chicago 5, Ill., and sold by all physicians' supply houses everywhere.

Free Samples

An adequate supply of samples is available to all in the profession for testing the practicality and applicability of Gauztex in any specific practice. We welcome your requests.

GAUZTEX
THE SELF ADHERING GAUZE

ARMY SERVICE FORCES
Port of Embarkation

DISPENSARY PERMIT—CASE NO. .....
(Dispensary Register No.)

TO: INDUSTRIAL DISPENSARY

DATE	No. of Days Absent	Time Left Job	Time Returned

Bearer's Name	Badge No.	Occupation

Return to Supervisor (Name)	Section

DISPENSARY REPORT	Time Reported	Time Released

( ) 1. Occupational ( ) 2. Non-Occupational
( ) 3. Return to Work ( ) 4. Sent Home
( ) 5. Transferred to ..... Hospital
( ) 6. To return for Further Treatment:
Date ..... Time .....
( ) 7. Referred to own physician .....
( ) 8. Other Disposition .....
( ) 9. Remarks .....
.....
( )10. Employee $\frac{\text{is}}{\text{is}}$ not fit to return to work.

INSTRUCTIONS

1. This permit excuses the bearer from his work for the minimum time necessary for treatment at a Port Industrial Dispensary.
2. Employee will retain this Permit if further treatment is required. If an employee is sent home for a condition for which this Permit was issued, the same form will be presented at the Dispensary on returning to work after absence due to illness.
3. This Permit will be retained until treatment is terminated and then will be given to the Supervisor.

Signed .....M. C. or Ind. Nurse
Port of Industrial Medical Program

Fig. 36.
Dispensary Permit Form (front)

used in conducting the periodic examination and a Dispensary permit form which is used by all working sections at the port in referring patients to a dispensary facility. Prior to the onset of the program it was found that very little check could be made as to the time taken by an employee in seeking medical care. With the use of the permit form, accurate records can be maintained of the time each patient has left his section, the time he reported to the dispensary, the time he left the dispensary, and the time he returned to his supervisor (Figs. 36 and 37). The form "Civilian Employee Medical Care, Daily and Monthly Report" provides a tally sheet for the accurate classification of all patients reporting to the Dispensary. The breakdown as to non-traumatic conditions and traumatic conditions was adopted from a form em-

Date to Report for Re-Treatment	TIME				
	Supervisor	Dispensary			Supervisor
	Left Work	Arrived	Left	Disposition	Returned to Work

Treatment Terminated	Date	Signed By:
		Medical Officer or Ind. Nurse

Fig. 37.
Dispensary Permit Form (reverse)

ployed by a large medical department in private industry.[24] This form not only provides the number of visits, but also offers a classification of the injuries occurring throughout the Port, the patient disposition, and a tabulation of the existing health hazards which have resulted in occupational illness. (Fig. 35).

In Fig. 38 may be seen the "Civilian Employees Medical Care, Daily Register of Patients" form which is used in the industrial dispensaries throughout the Port and serves as the clinical record maintained by the industrial nurse.

DIM-3
DATE:
SECTION:

ARMY SERVICES FORCES
PORT OF EMBARKATION
CIVILIAN EMPLOYEES MEDICAL CARE, DAILY REGISTER OF PATIENTS

Name	Absent Present	Complaint	First Visit For This Complaint		If Injured Was It Done On Duty		Section	Occupation	Diagnosis	Treatment	Rest	Sent Home	Disp. Visit	Private Doctor	U.S P.H.S.	Hosp.
	– +		Yes	No	Yes	No										

PORT INDUSTRIAL MEDICAL PROGRAM

Fig. 38.
Civilian Employees Medical Care, Daily Register

N
A
M
E

SECTION	OCCUPATION	NUMBER	AGE	SEX M	SEX F	RACE W	RACE C	RACE B	RACE Y	MAR. S	MAR. M	DEP. Y	DEP. N	CLASSIFICATION A	CLASSIFICATION B 1	2	3	4	5	6	7	C

DATE	NO.	DATE	SMALLPOX VACCINATION	TYPHUS IMMUNIZATION
PRE-PLACEMENT P. EX.	CHEST PLATE – +	KAHN TEST – +	TYPHOID IMMUNIZATION	

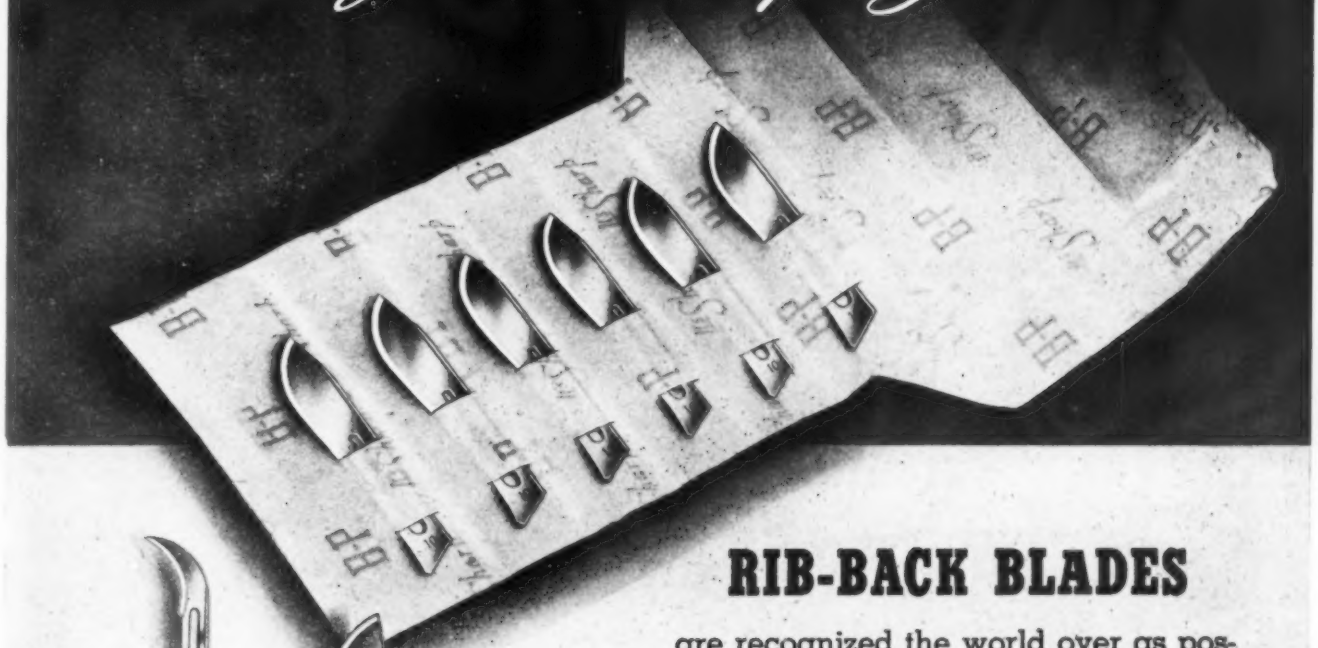
PERIODIC PHYSICAL EXAMINATION DATES

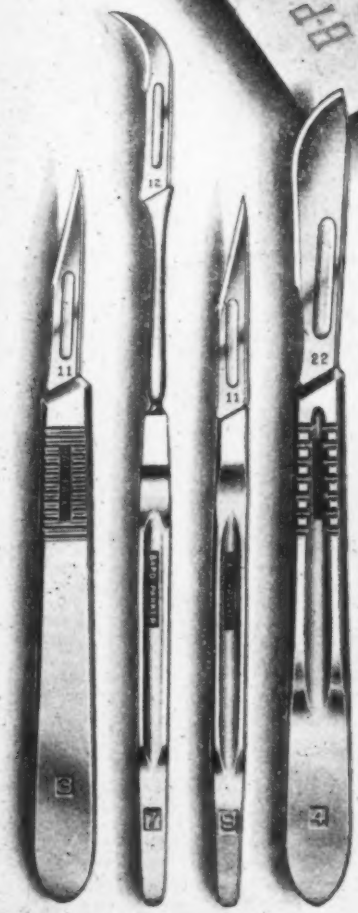
194	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1												
2												
3												
4												

DIM 7 PORT INDUSTRIAL MEDICAL PROGRAM

Fig. 39.
Absentee Status Card (front)

Prelude to *Successful Surgery*





RIB-BACK BLADES

are recognized the world over as possessing a degree of uniformity indispensable to the attainment of desired functional efficiency in surgery.

Each and every blade provides—

Uniform sharpness throughout the entire length of the cutting edge.

Uniform resistance to lateral pressure by virtue of the exclusive Rib-Back principle of blade reinforcement.

Uniform fabrication which insures firm and accurate attachment to Bard-Parker Handles.

Uniform pre-war qualities that have suffered no wartime change.

Ask your dealer

BARD-PARKER COMPANY, INC.
Danbury, Connecticut

A BARD-PARKER PRODUCT

− Absent	O—Occupational
+ Present	N—Non-Occupational

NON-TRAUMATIC CONDITIONS

A—Advisory Services
B—Cardiovascular Diseases
C—Dermatoses (Non-Occupational)
D—Ear Diseases (Non-Respiratory)
E—Eye Diseases (Non-Respiratory)
F—Gastro-Intestinal Diseases
G—Genito-Urinary Diseases (Except V.D.)
H—Headaches
J—Menstrual Disorders
K—Nervous and Mental States
L—Neuritis
M—New Growths (Including Cancer)
P—Orthopedic Diseases
Q—Pyogenic Infections
R—Respiratory Diseases
S—Thermal States
T—Toothache
U—T.B. (Active and Inactive—All Forms)
V—Venereal Diseases
W—Miscellaneous

TRAUMATIC CONDITIONS

1—Abrasions
2—Amputations
3—Burns
4—Contusions
5—Dislocations
6—Fractures
7—Friction Injuries
8—Foreign Bodies
9—Herniae
10—Infections (Secondary)
11—Lacerations
12—Orthopedic Sequelae
13—Puncture Wounds
14—Sprains and Strains
15—Miscellaneous

PARTS INJURED

①—Abdomen
②—Arms
③—Back
④—Chest
⑤—Eye
⑥—Feet
⑦—Hands
⑧—Head
⑨—Legs

OCCUPATIONAL HAZARDS

Ⓐ—Abnormalities of Air Pressure
Ⓑ—Abnormalities of Temperature and Humidity
Ⓒ—Dampness
Ⓓ—Defective Illumination
Ⓔ—Dust
Ⓕ—Infections
Ⓖ—Radiant Energy
Ⓗ—Repeated Motion, Pressure, Shock, etc.
Ⓘ—Poisons
Ⓙ—Dermatoses

DISPOSITION

▲—Dispensary Visit
▼—Rest Ward
□—Hospital
* —Home

ADDITIONAL

Fig. 40.
Absentee Status Card (reverse)

The entries are self-explanatory and again provide an accurate estimate of daily visits from perusal of the sheet.

In the recording of sick absenteeism and patient visits as to cause, a five-by-eight inch tab card is employed which provides, in chronological order, the patient's complete medical history for one year. It shows the date of the initial pre-placement physical examination, the conducting of concomitant diagnostic procedures, and all identifying information. The code, which is printed on the back of the card, was adopted from the classification column of the form seen in Fig. 37 and, through hand entries on the obverse of the card, an instant record of the patient's health is available. A scanning of these cards at the end of the week or month provides the status of illness or absenteeism as to cause at any installation of the Port. This card is primarily employed as a record of the employee, whereas other forms are used to visualize the actual medical status throughout the port (Figs. 39 and 40). Information on the individual patient is secured from a checked mimeographed form (Fig. 41) and this material is transcribed to the card, Fig. 39.

A two and one-half by four inch wallet size immunization register is seen in Fig. 42 which indicates the immunizations the civilian employee has received. It will be noticed that some unusual immunizing procedures are listed but, in view of the fact that this card is supplied also to civilian employees going through the port on their way overseas, this inclusion is logical.

Liaison with External Agencies

IT IS the long established policy of the Office of the Surgeon to avoid, in the execution of the Industrial Medical Program, the rendering of such complete medical care to government employees as to obviate the need of the private physician. Paralleling this premise is the active liaison with the local practitioner. If there are pathological findings encountered on completion of the pre-placement physical examination, a form of the type seen in Fig. 43 is sent to the employee through the Employee Relations Section, in an effort to have the individual seek follow-up care or further diagnostic procedures. Full reports are forwarded to the practitioner of the patient's choice and positive findings are re-checked

DATE_____
CASE NO._____

CIVILIAN EMPLOYEES MEDICAL CARE—STATUS REPORT

Section Reporting: 1( ) Camp 2( ) Camp 3( ) Fort 4( ) Fort 5( ) P. of E. 6( ) Station Hospital 7( ) Barracks

O( ) New Case
X( ) Old Case
Absent sick from_____ to_____
Number of days_____
Day of week beg._____

Name of Patient_____ Section_____
Occupation_____ Age_____

Mil. Dep: 1( ) Yes 2( ) No
Race: 1( ) White 2( ) Colored 3( ) Brown 4( ) Yellow
Sex: 1( ) Male 2( ) Female
Marital Status: 1( ) Married 2( ) Single 3( ) Widowed 4( ) Divorced

PHYSICAL EXAMINATION: Pre-placement_____ Periodic_____

Classification:
A0( ) physical condition satisfactory for any type of duty
B1( ) approved only for clerical or sedentary type of duty
B2( ) approved only for light manual labor
B3( ) approved only for duty requiring no prolonged standing
B4( ) approved only for duty not requiring excessive climbing or muscular agility
B5( ) approved only for duty not requiring good vision
B6( ) approved only for duty not requiring good hearing
B7( ) approved only for operating of motor vehicles or other moving equipment
C9( ) rejected for any type of duty

Chest Plate Number_____ 1( ) Positive 2( ) Negative
Smallpox vaccination_____ Typhoid Immunization_____ Typhus Immunization
Other Immunization_____ Kahn Test_____ 1( ) Positive 2( ) Negative

1( ) Absent Sick
2( ) Present Sick

1( ) Occupational
2( ) Non-occupational

TRAUMATIC CONDITIONS:
1( ) Abrasions
2( ) Amputations
3( ) Burns
4( ) Contusions
5( ) Dislocations
6( ) Foreign Bodies
7( ) Fractures
8( ) Friction Injuries
9( ) Herniae
10( ) Infections (Secondary)
11( ) Lacerations
12( ) Orthoped. Sequelae
13( ) Puncture Wounds
14( ) Sprains and Strains
15( ) Miscellaneous

NON-TRAUMATIC CONDITIONS:
1( ) Advisory Services
2( ) Cardiovascular Diseases
3( ) Dermatoses (Non-Occupational)
4( ) Ear Disease (Non-Respiratory)
5( ) Eye Disease (Non-Respiratory)
6( ) Gastro-Intestinal Diseases
7( ) Genito-Urinary (Except V. D.)
8( ) Headaches
9( ) Menstrual Disorders
10( ) Nervous & Mental States
11( ) Neuritis
12( ) New Growths (inc. Cancer)
13( ) Orthopedic Diseases
14( ) Pyogenic Infections
15( ) Respiratory Diseases
16( ) Thermal States
17( ) Toothache
18( ) T.B. (active and inactive, all forms)
19( ) Venereal Disease
20( ) Miscellaneous

PARTS INJURED:
1( ) Abdomen
2( ) Arms
3( ) Back
4( ) Chest
5( ) Eyes
6( ) Feet
7( ) Hands
8( ) Head
9( ) Legs

OCCUPATIONAL HAZARDS CLASS:
1( ) Abnormalities of Air Pressure
2( ) Abnormalities of Temp. and Heat
3( ) Dampness
4( ) Defective Illumination
5( ) Dust
6( ) Infections
7( ) Radiant Energy
8( ) Repeated Motion, Pressure, Shock, etc.
9( ) Poisons
10( ) Industrial Dermatoses

DISPOSITION:
1( ) To Home
2( ) To Hospital
3( ) To Rest Ward
4( ) To Work
5( ) From Home
6( ) From Hospital

No. of Home Days_____
No. of Hospital Days_____

6-44-10,000
Port Ind. Med. Program

Reporting Officer or Nurse

Fig. 41.
Civilian Employees Medical Care, Status Report

"greatest little 'cold-stoppers' in the world..." DIXIE CUPS

For plant-wide protection against mouth-carried infections, recommend Dixie and Vortex Cups for office and factory drinking fountains, and Dixies and Pac-Kups for in-plant feeding. This way you have an *automatic* guard against contagions that all too often come from faulty dishwashing. Single-use Dixies are a "safety first" provision.

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IMMUNIZATION REGISTER

NAME_____

SMALLPOX VAC. REACTION_____

TYPHOID COMPLETED_____

TETANUS COMPLETED_____

YELLOW FEVER COMPLETED_____

CHOLERA COMPLETED_____

OTHER_____

Fig. 42.
Immunization Register

frequently, prior to referral of a patient, so that the clinical data provided will be accurate.

In many instances where a civilian employee of the Port is hospitalized in a private institution the physician will be contacted so that, firstly, the condition requiring hospitalization will be known to the Medical Department and, secondly the employee will know of the Port's interest in his case. Infrequently, house calls will be made on convalescent patients so that a continuous report may be maintained throughout the patient's illness.

The services of the local department of public health have proved invaluable in connection with the more difficult portions of a preventive medicine program. These services have included the active contacting of the patients, the initiation of further diagnostic tests, and the referral of patients to either public or private agencies. These methods of definitive diagnosis and care have been adopted in all cases demonstrating positive findings in the chest x-rays or blood examinations. The activity of the tuberculosis will be determined, and recommendations are then made to the Port as to the patient's work disposition, i.e., limited duty, termination of service, re-check at stated intervals, or no change in heretofore established employment regime. Patients are referred to either private physicians of their own choosing, or the Chest Clinic and City Hospital of the Municipal Department of Health.

The Bureau of Communicable Diseases notifies the Industrial Medical Section on the completion of examinations taken by the City Department of Health in its clinics or hospital. Notification of the recommendation is submitted to the Employee Relations Section and information is likewise forwarded to the local Civil Service District. In the case of positive Kahn and Wassermann examinations, the information is forwarded to the Venereal Disease Bureau of the local department of public health, and that department undertakes the checking of all contacts and completion of further diagnostic procedures. It likewise initiates anti-luetic therapy and, in the event the patient lapses in his treatment program, the visiting representative of that Bureau will make all efforts in placing the patient under continuous care. This program is of particular value, since the Port Dispensary does not provide care for venereal disease.

Women in Industry

As several thousand women are employed throughout the Port, definite problems have arisen in connection with their adaptation to craft occupations. The specific problems of women employees are first gone into at the time of the pre-placement physical examination when they are asked about menstruation, dysmenorrhea and, particularly, their problem in regard to the prospective number of days that they usually lose from work per month. In those instances where a pelvic examination is felt desirable it is offered by a woman physician but is not at all mandatory. Several of the new women employees, particularly in the older age group, have been desirous of having the examination conducted and are appreciative of notification of the findings when unusual conditions are encountered.

The War Department has provided that specific follow-up attention be paid all women employees who are pregnant, and such rules have been established[25] governing the employment of pregnant women at Army owned and Army operated installations that come within the scope of the Industrial Medical Program.

It is the general policy that a pregnant employee should not be continued at work beyond the thirty-second

(Report with this slip to the X-Ray Department, Bldg. 240 on the date and time indicated).

CHEST X-RAY SURVEY

DAY_____ DATE_____ 1944 TIME_____ A.M. P.M.

NAME_____ AGE____ BADGE NO.____

(Last Name) (First) (Initial)

SECTION WHERE EMPLOYED_____

(Please print all information)

X-ray examination helps detect disease in its early stages. Your cooperation is appreciated. If we send you no message, we found no disease. If we notify you for a retake, do not be alarmed as it may be a technical error on our part and another x-ray film is needed. You will be told *privately* if we find any disease.

6-44-15,000

Fig. 43.
Chest X-Ray Survey Appointment Form

week of pregnancy, that her return to work be postponed until six weeks post-partum, and that this should be done only in complete concurrence with the private physician. Every effort is made to have female employees report their condition to the Medical Department so that proper supervision of the job may be instituted and so that the individual employee may be guarded in her work. A questionnaire has been devised which is presented to each prospective female employee at the time of her pre-placement physical examination. The form may be seen in Fig. 44 and in this manner, the Industrial Medical Section is notified of any immediately existing pregnancies.

The War Department has recommended that a pregnant employee report to the Medical Department semi-monthly and, during this visit, the nature and hours of her work will be ascertained so that if unfavorable symptoms have developed during the past period of employment, corrective action can be taken through appropriate recommendations to the chief of the section wherein the patient is employed.

It has been deemed inadvisable to have pregnant women employees work between the hours of 12:00 midnight and 6:00 in the morning and they should not work longer than the normal 48-hour week. Two 10-minute rest periods during the eight-hour work shift should be allowed. Work requiring heavy lifting or strain should not be given these employees or any type of work that in the opinion of the Army Medical Officer or the patient's private physician would prove at all detrimental to her well-being. The main point of consideration is the recommendation of the Women's Bureau of the U. S. Department of Labor[26,27] and the Committee on the Health of Women in Industry[28] that maternity leave should be provided without jeopardizing the employee's job rehiring. Portions of the War Department directive were publicized in one of the Industrial Health Bulletins of the Industrial Medical Office and the response has been fairly good, in that the employees have reported their condition. The inherent tendency in women, however, not to discuss pregnancy is apparent on the job, and it is still felt that the women employees, in spite of the above, are all too fearful of job loss if the condition is discovered. Education has been directed, not

PRE-PLACEMENT PHYSICAL EXAMINATION

* * * *

SUPPLEMENTAL HEALTH QUESTIONNAIRE

Since women are being assigned to many types of war jobs not previously filled by women, it is necessary that special precautions be taken to protect their health. The hiring of women who are pregnant has long been a policy of the Port of Embarkation, the only governing fact being that the performance of certain jobs is detrimental to health in the various stages of pregnancy.

All female employees, therefore, are requested to check the appropriate blank below and sign the indicated agreement in order that the Industrial Medical Section may be able to recommend proper placement and care as required either at the present or in the future.

I am not now pregnant_____

I know that I am pregnant_____

I think that I am pregnant_____

In the event I suspect I am pregnant I will report to my personal physician; and I further agree that if and when I am sure I am pregnant, I will report to the Industrial Medical Section to check the nature and hours of my work.

Signed_____

Date_____

770-DR-1-10-44-150

Fig. 44.
Supplemental Questionnaire, employed in pre-placement physical examinations conducted on women employees

MIGRAINE

"Emotional states, such as frustration, resentment, hostility and humiliation, associated with abrupt changes in the pace of living... together with physical fatigue, activate the migraine mechanism."*

*Simons, D. J., and Wolff, H. G. (The Management of Chronic Diseases of the Nervous System): M. Clin. N. Am., p. 434, March, 1944.

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only toward the employee here but also to her section chief, so that due consideration will be given pregnant employees in keeping with the conditions outlined.

As many of the female employees at the port are service dependents, advice is rendered as to the securing of hospital care under the Emergency Maternity and Infant Care Program wherein, through grants made by the Children's Bureau of the U. S. Department of Labor, medical, nursing and hospital maternity and infant care have been provided without cost to the wives of enlisted personnel of the fourth, fifth, sixth, and seventh grades of the armed forces. Through the local Red Cross chapter, application blanks are secured and the employee is directed to the local health agency or institution rendering this type of service.

The Accident Prevention Section of the Port has attempted to outline the type of clothing to be worn by women engaged in such occupations as welding, electrician's helpers, mechanic's helpers and the like, in jobs of the ships maintenance and repair program. The usual recommendation of visored caps, one or two piece suits, and recommendations in regard to jewelry, high-heeled shoes, etc., are made. During the training program, through informal talks, proper clothing and health habits are discussed so that the trainee when assigned to a permanent job will be dressed properly and will not at that point have to change her routine in preparation for the job. The positions held by women at the Port are as follows:

TABLE 15.
POSITIONS OCCUPIED BY WOMEN EMPLOYEES AT A PORT

Auto Mechanic Helpers.	Medical Officers.
Card Punch Operators.	Medical Technicians.
Chauffeur Mechanics.	Mess Attendants.
Chemists.	Messengers.
Clerks.	Motor Vehicle Dispatchers.
Cooks.	Naval Architects.
Cost Accountants.	Packers.
Counsellors.	Painters.
Cryptographic Clerks.	Painter Helpers.
Dental Assistants.	Patrolwomen.
Dental Hygienists.	Pharmacists.
Drivers, Bus.	Pipefitters.
Drivers, Sedan.	Pipecoverers and Insulators.
Drivers, Truck.	Registered Nurses.
Duplicating Equipment Operators.	Sanitary Technicians.
Electrican Helpers.	Statisticians.
Embossograph Operators.	Sheetmetal Helpers.
General Mechanic Helpers.	Shipfitter Helpers.
Interviewers.	Stenographers.
Junior Welders.	Storekeepers.
Junior Riggers.	Tabulating Equipment Operators.
Laboratory Helpers.	Tallyman.
Librarians.	Teletype Operators.
Light Laborers.	Timekeepers.
Linen Room Attendants.	Typists.
Machinists.	Ward Attendants.
Machinists Helpers.	Welders.
Matrons.	Welder Helpers.

From the above it may be seen that there is a wide range in type of employment and practically all jobs that are capable of being handled by women are so filled.

Summary

THE Industrial Medical Program of the United States Army as it applies to a port of embarkation is described in detail and the personnel required for the execution of such a mission are delineated.

The physical facilities required for the carrying on of a medical program for civilian employees at a port are described and procedures are outlined in connection with the rendering of medical care to employees.

The Industrial Medical Section of the size discussed provides many preventive medical procedures including orientation of the applicant, the pre-placement physical examination, the periodic physical examinations, the post-sickness and absentee checks, and the medical exit interviews conducted with those individuals desiring release or in those cases of bad job adjustment.

The methods employed in these procedures and the chest and syphilis surveys are shown, and the method of execution is presented.

In addition to preventive medicine, specific therapeutic methods are presented, and the type of care rendered government employees for illnesses and injuries is shown.

Health promotion plays an important part in the conducting of an Industrial Medical Program and the modus operandi of such an education program is illustrated.

The Industrial Medical Section recommendation of the installation of appropriate sanitary facilities is given, and the approach to the elimination or control of occupational health hazards is shown as to its operation.

Accurate records are maintained in the providing of the full picture of the progress made in a medical program of this caliber, and the forms employed are illustrated.

Conclusions

THE Industrial Medical Program at a Port of Embarkation has been successful through the execution of preventive medicine and therapeutic procedures in keeping employees on the job and reducing, by 50%, the amount of absenteeism resulting from illness.

2. Occupational health hazards, through survey methods, are placed under control, and the individual worker is protected against the exposure of his job.

3. The health of a large working group is safeguarded as an organization on the front line of the country's supply service.

4. The maintenance of the health of the worker is of the utmost importance in sustaining the flow of supplies and the regular departure of troops to the vital theaters of operation.

5. A sound Industrial Medical Program, as outlined by the War Department, should include:

(a) An organized method of procedure in the form of regulations.

(b) Carefully selected personnel to execute the program.

(c) Adequate dispensary facilities so that all types of medical care may be offered.

(d) Orientation of the prospective employee so that he is familiar with the medical facilities available.

(e) Carefully conducted pre-placement physical examinations followed by logical recommendations for job placements.

(f) Periodic physical examinations that will protect the health of key personnel and workers engaged in hazardous occupations.

(g) Examinations, interviews and other studies necessary in combating unnecessary absenteeism due to illness.

(h) A continuous immunization program.

(i) Annual chest and syphilis surveys, with follow-up studies and placement by allied agencies.

(j) Complete medical care for occupational injuries and illnesses and emergency medical care for non-occupational illnesses or injuries causing discomfort on the job or possible absenteeism.

(k) An energetic health promotion program carried on through all means of publications, talks, and individual contacts.

(l) A complete system of records that will provide the Industrial Medical Officer with accurate information as to the state of health of the working group.

(m) Recommendations for the installation of good working conditions and adequate sanitary facilities for the worker.

(n) Complete control of existing occupational health hazards.

(o) Solution of the individual problems of women in industry.

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Long Island College Course in Industrial Medicine

LONG ISLAND COLLEGE of Medicine, Brooklyn, New York, will offer its Fourth Post-graduate Course in Industrial Medicine in the three-weeks' period between January 14 and February 1, 1946. The course will be conducted under the auspices of the Department of Preventive Medicine and Community Health by a group of distinguished leaders in industrial medical practice, authorities in industrial hygiene and allied fields, and members of the faculty of the College. The course is planned to interest especially members of the medical profession who have been with the Armed Forces, and is timed so as to enable their attendance. According to a survey recently conducted by the Postwar Medical Service of the American Medical Association, approximately one out of five medical officers in service desire to practice industrial medicine on their return to civilian life, and more than 40% of them expressed a need for special training in this field. Preference in enrollment will be given to graduate physicians, although applications will be accepted also from industrial executives, personnel workers, nurses, engineers, representatives of labor, insurance companies and other groups interested in industrial health. Emphasis in the course will center upon health problems of workers under peacetime conditions. Lectures and seminars will be supplemented by clinics and demonstrations in medical departments of cooperating industries, teaching hospitals, industrial hygiene units, and other agencies active in the field. Provision will be made for a limited number of students to obtain subsequent additional supervised in-plant training in industrial medical departments. Inquiries should be addressed to DR. THOMAS D. DUBLIN, Long Island College of Medicine, 248 Baltic Street, Brooklyn, New York.

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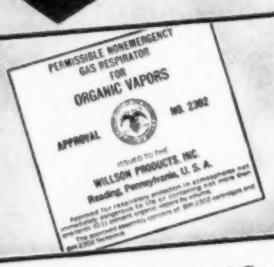

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Health Aspects of Aluminum Ponton Work

FORREST E. RIEKE, M.D.,
Medical Director,
Oregon Shipbuilding Corporation and Kaiser Co.,
Portland, Oregon

CONCENTRATION of 100,000 workers in five Portland war-industry plants has raised a host of industrial health problems new to all of us. In the face of swift moving events, shortage of personnel and inadequacy of scientific preparation in industrial health matters, many of us have often felt entirely nonplussed at the size and nature of the tasks which big industry callously hands us. Easing the difficulties which have beset us is the fact that local war-workers have been employed in closely coordinated plants, a few in number, where problems were similar and where solutions could be quickly disseminated to both workers and their supervision. Of assistance, too, was the early and wide recognition that health of workers was paramount if production was to continue unimpeded. This realization by all concerned has given a unanimity of purpose in preservation of health of the worker rarely seen before the war. It is most important that the medical profession recognize that this shared wartime experience of labor, management and the profession in the field of health has given the former two groups a much wider insight into medical matters. They now share an aggressive determination to continue expanded health services; they have every expectation that physicians will exert a vigorous leadership in continuing and enlarging *health maintenance work* after the war. Both labor and management anticipate that this will be a joint and cooperative venture for they have learned of their very sizable stake in the worker's health and productive capacity and will expect to participate in support and guidance of efforts in their behalf. Today as Portlanders look forward to decentralization of large industrial units, it is well that we analyze wartime industrial health problems, giving thought to objectives, methods, mistakes and lessons of future value. The unique forces at work during the war years have thrown into bold relief certain aspects of health work that hold great value for workers, their employers and the community. I hope that we shall have courage and vision enough to preserve and expand new-found advantages of on-job medical work as our industrial "plant" changes in size, type and location with the advent of peace.

Two years ago, those of us new in industry would have said that industrial medicine was simply the practice of medicine in industry. Today we take a different view of our work. We talk in terms of preventive medicine and maintenance of health; we treat thousands of minor ailments to prevent serious complications; we cull out those with very serious ailments and send them to private physicians; we insist that our workers get physician health care and avoid quacks; we examine workers with respect to the demands placed upon them by their jobs, arranging transfers when incompatibilities are found; we search for evidences of disease or injury arising from jobs and try to correct the job or environment so as to remove the injurious factor; we check the environment and advise with the engineers on ways to "build-out" health hazards; and we attempt to "look at" the workers periodically to see that they remain free of occupational injury and that no degenerative disease process supervenes to make them unsafe in their work. We now believe that industrial dispensaries have brought trained medical personnel closer to the daily life of local workers than medical care and advice have ever before come. We know that this proximity has taught us much about the worker's health needs and that we have taught him a great deal about better use of health services and care of himself. We believe that these functions are of such value that they must be preserved.

A year ago at this industrial plant, in a similar meeting with the Oregon Occupational Disease Board of Review, I pointed out that passage of the Occupational Disease Law (Chapter 442, of the Oregon Laws of 1943) changed and expanded the role of every Oregon physician in industrial medical work in several ways.

1. The law, in effect, changed our definition of "hazardous industry," adding to the list of those which are patently violent and forceful nearly every other occupational pursuit, for most work processes, no matter how genteel, present some occupational disease hazard.

2. The law recognized that physicians are better qualified than any other persons or groups to adjudicate questions of occupational disease and it, therefore, gave them specific responsibility to make final decisions on any and all issues, claims and awards arising in this category.

3. The latter provision made it obligatory that physicians thoroughly inform themselves on industrial processes and occupational factors in disease so as to avoid inequity in administering the Occupational Disease Law; and

4. The Law gave us the task of discovering and defining "occupational disease," of searching for its several causes, of treating its manifestations, and of studying and working to prevent its occurrence.

Many qualified writers have pointedly stated that industrial medical work is a specialty of no mean proportions; that physicians who dip superficially into the industrial health field and voice opinions based upon incomplete information do a disservice to themselves and all concerned. Recognizing the important role of local practicing physicians in the health care of workers at Oregon Shipbuilding Corporation, I have attempted to bring together for your use all the available facts on the health aspects of aluminum work as we are doing it. I shall also illustrate the part played by industrial physicians and the safety engineer in occupational disease research, in preventive "health engineering," in instruction of the working public in matters affecting its health, and in maintenance of health of workers when applied to the problems inherent in a new or changed production process. A brief chronological review will throw later information into perspective.

I. Chronology of a New Industrial Health Problem

IN MID-DECEMBER, 1944, Mr. Kaiser advised by wire that we were to prepare for immediate construction of 4,000 aluminum pontons for the army. A few such objects had been constructed on an experimental basis in an eastern plant but no one was yet producing them in volume. Specifications were not immediately available but we knew that they would be boat-like, composed of sheet aluminum riveted to aluminum "extrusions" or structurals, and that the surfaces would be coated with a protective "paint" film of some sort.

Pending the arrival of detailed specifications we sought instruction from local sources concerning the chemistry of aluminum, how the metal and its alloys were handled in aircraft work, through what technical processes it was passed before assembly, and what health difficulties, if any, had been encountered by those occupied at such work.

Reference to the usual medical library sources on industrial hygiene and toxicology revealed a pronounced scarcity of information about the chemistry and hazards of aluminum work. Previous research on the toxicology of zinc chromate paint used on naval troop transports had produced an excellent paper[1] on dermatological problems encountered among aluminum workers at the Douglas Aircraft Plant at Santa Monica. Direct questioning of the chemist and head nurse at a local aircraft sub-assembly plant unearthed several leads. They described dermatitis and nasal irritation among those working around certain chromic acid dipping and anodizing tanks. Some trouble had been experienced where zinc chromate paint was sprayed and heat-dried. The chemist pointed out that aluminum use had skyrocketed in such recent times that very few of the many new developments and discoveries were yet to be found in technical literature. Articles on the chemistry and toxicology of chromium, chromic acid and chromates were found to be scarce, but several papers describing the hazards of chromic acid electroplating seemed pertinent.

By early January army specifications were obtained and it then became necessary to evaluate the several alternative production methods permitted thereby. We were informed that the "skin" of the ponton had to be riveted in place and that there would be very little welding of aluminum. We learned that because aluminum and its alloys are apt to corrode, especially in contact with salt water, they must be well coated with aluminum oxide, resinous lacquer or a primer coat of paint such as zinc chromate yellow. To do this all grease must be removed chemically before paint would stick and it was also necessary to "etch" the surface to supply "tooth" to which paint could adhere.

From information available to the plant engineers it was decided that we would:

1. Cut, roll, stamp, punch and in other ways shape aluminum stock to proper configuration for assembly;

2. Degrease these various aluminum "shapes" in an alkaline detergent solution called Oakite No. 61 (a non-foaming soap solution maintained at a pH of 10.5 and 190° F), remove the soap by water spray rinse, and dry the aluminum with a hot air blast;

3. Etch all surfaces by immersion for two and a half minutes in a 5% chromic acid solution (maintained at 140° F and agitated by pump), rinse off excess acid with a water spray and air dry;

4. Cover all surfaces of the aluminum "shapes" with a primer coat of zinc chromate yellow paint which is dried by hot air blast;

5. Following assembly and testing of the ponton, cover the vessel with a coat of phenolic, lusterless enamel (applied by brush and spray equipment).

As mentioned, health difficulties had arisen in association with degreasing, etching and painting aluminum, and in subsequent drilling and machining of painted aluminum. Our main assistance to plant engineers consisted of counseling on selection of the least hazardous etch process and paints, and proper ventilation, locker space and bathing facilities. We then turned to the chemistry, toxicology and health hazards connected with our materials and processes and outlined protective and preventive measures to assure safe and healthful workers and working conditions.

II. Health Hazards of Materials and Processes

ALUMINUM AND ITS ALLOYS: The shell of our ponton was to be "Alclad" sheet which is duraluminum ("dural") coated with a thin layer of aluminum. The rivets are also "dural." "Dural" is an alloy of aluminum with variable amounts of copper, manganese, magnesium, and traces of silicon, iron, chromium, zinc and other elements. The "dural" used in our ponton work is composed of the following:

	Min. %	Max. %
Magnesium	0.8	1.2
Silicon	0.4	0.8
Chromuim		0.35
Iron		0.17
Copper	0.15	0.4
Titanium		0.15
Manganese		0.15
Zinc		0.2
Other Elements, of each		0.03
Other Elements, total		0.10
Aluminum—Remainder (approx.)		97-98

DR. R. F. HALL, consulting dermatologist at Douglas Aircraft at Santa Monica, discusses occupational contact dermatitis among aircraft workers,[1] and states that:

"Dural poisoning," "aluminum poisoning" and like expressions have been popularized by aircraft workers and threaten to find their way into medical parlance as haphazard diagnoses. In the series of 202 cases of occupational dermatitis subjected to analysis in this report, only 5% were found to be due to dural and only 2% to aluminum."

His report is based upon clinical observations of 755 employees referred to the "skin clinic" in six months' time, an average of 109 per month, from Douglas payrolls aggregating an estimated 65,000. If aircraft figures roughly parallel ours, one dispensary treatment per month per man on the payroll, dermatological complaints from dural and aluminum are seen to be relatively few.

DR. HALL points out that "dural" and aluminum dermatoses are sensitivity reactions displaying papular, excoriated lesions on the forearms which do not clear until the worker is removed from work with these materials.

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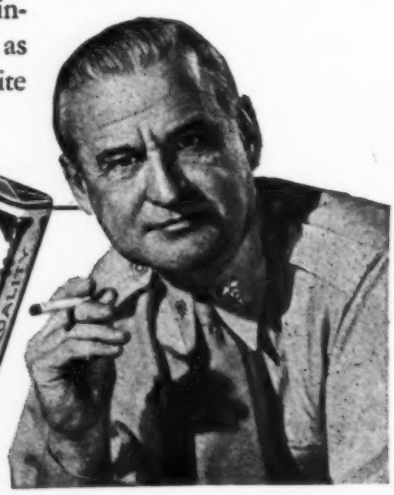
THE GUNS are silent once more. For the men with the guns, the war is over. But for the thousands of medical men in the service, the war still goes—their "war in white" in behalf of the wounded, the wearers of the Purple Heart. Doctors that they are, of medicine and morale, they well know how much a cigarette can mean to an invalid soldier. And servicemen that they are, as well, these doctors know what a big favorite Camels have been, and are, with men in all the services.



Camels

COSTLIER TOBACCOS

R. J. Reynolds Tobacco Company, Winston-Salem, North Carolina

In a recent paper on aircraft work Callahan[3] discusses the effect of aluminum particles when adherent to the eye. He reports a series of 404 eye injuries in an aircraft parts plant. He advises that an oxidation ring develops around an aluminum corneal foreign body as it does with iron. He believes that chemical sensitivity plays a prominent part when aluminum foreign bodies adhere to the conjunctiva, basing this opinion on the fact that "the eye remains inflamed for several days after the removal of the aluminum particle, in contrast to the quick recovery observed with other types of foreign bodies." No details are given as to the chemical processes through which the aluminum passes in preparation for fabrication.

Some years ago the manufacturers of aluminum kitchenware and aluminum-containing baking powders went to great lengths[3, 4, 5] to demonstrate that continuous ingestion of small amounts of aluminum and aluminum oxide are harmless when ingested in ordinary amounts and diligent search reveals no statement that "dural" behaves otherwise than the parent metal.

The innocuous nature of aluminum is further demonstrated by wide use of its hydroxide in colloidal antacids such as "amphojel." Goodman and Gilman[6] report that experimentally and clinically aluminum hydroxide has proved benign over long periods of time both with respect to toxic side-actions and normal digestion and absorption. They further state: "Neither are any untoward systemic effects observed in individuals receiving orally large amounts of insoluble aluminum compounds, despite the fact that appreciable quantities are probably rendered soluble by the acid gastric contents. . . . The single toxic parenteral dose of aluminum chloride or sulfate in experimental animals is high, over 5.0 grams per kilo."[7]

It may have escaped your notice that the latest development in the treatment of silicosis involves repeated and prolonged inhalation of finely divided aluminum and aluminum oxide powder.[8, 9, 10, 11] After prolonged experimentation physicians at the McIntyre-Porcupine Gold Mines in Ontario[8] discovered that the presence of small amounts of aluminum powder almost completely inhibited the solubility of silicious material in vitro. Subsequent animal experiments[9] showed that addition of as little as 1% of aluminum powder to inhaled silica dust completely prevented the occurrence of silicosis, even after prolonged exposure. The latest paper in this series[10] reports apparently successful treatment of silicotics by inhalations of finely ground, fresh aluminum powder, breathed from a closed respirator system for periods up to 30 minutes a day, six days a week for over 200 treatments. The inspired powder is freshly ground for inhalation and contains both aluminum and aluminum oxide. By early 1944, 50 men had received this form of treatment and no deleterious effects are reported. The authors of the latter paper[10] report that prior to initiation of their human investigations they learned from physicians at the Pittsburgh plant of Aluminum Company of America that men working for six to 23 years under heavy exposure to powdered aluminum enjoyed the same or better health than 3,000 other workers in the same plant.

In the light of recorded previous experience, we anticipated little trouble from aluminum or dural, as chemical irritants or allergens. Four months of dispensary treatment and close observation of the 3,000 men and women handling these materials has not revealed an instance of skin trouble on either basis. We have been able to follow ocular foreign body injuries arising simultaneously among 3,000 aluminum ponton workers and 25,000 steel ship workers, for both groups are cared for in the same dispensary and eye treatment room. Our experience does not parallel that reported by Callahan regarding unusual persistence of conjunctival irritation after removal of aluminum foreign bodies. In our hands the conjunctiva seems to behave about the same following adherence of aluminum or iron. Very small light-colored bodies do occasionally escape detection for a day or two, but once they are discovered and removed, healing is prompt.

MACHINING OF ALUMINUM: Several operations involve grinding, drilling, sawing and polishing aluminum objects. Oils used to cool and lubricate cutting edges of

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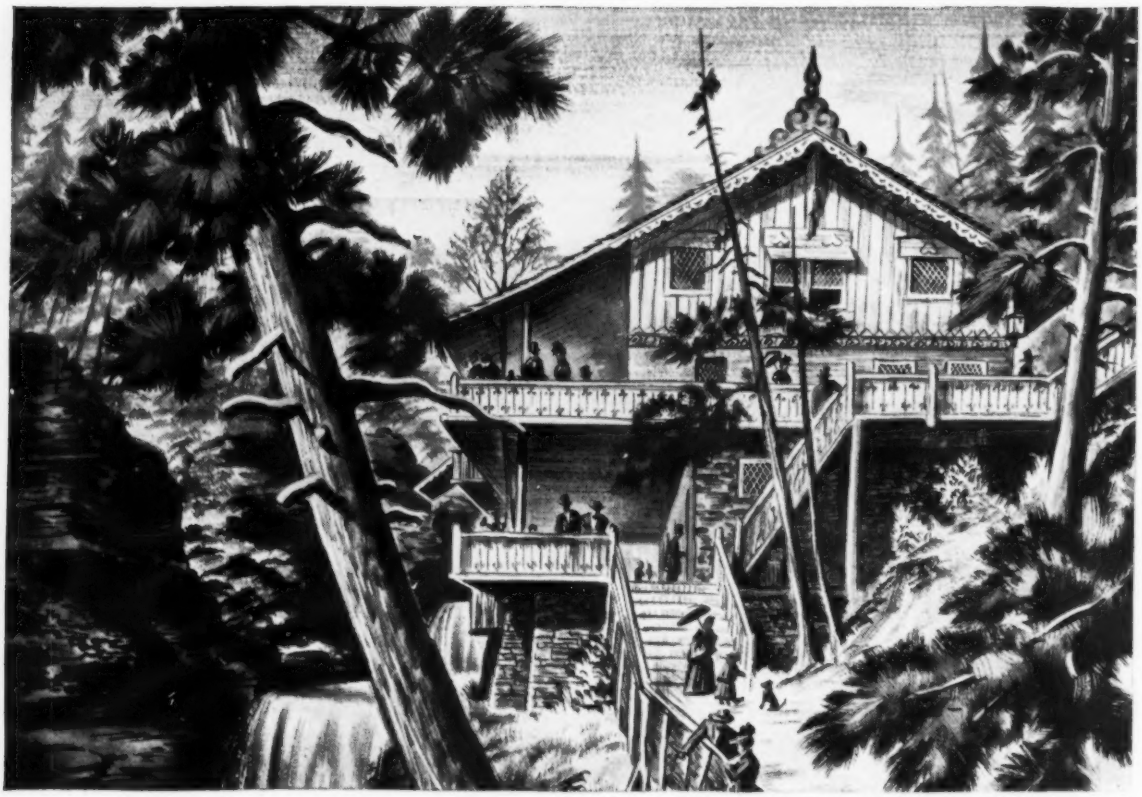

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machine tools in this type of "machining" are of the fat soluble variety, but are light-bodied, low in sulfur and chlorine content, are not re-used and are present in small amounts at any one operation. Cutting oil dermatitis from this source has not been encountered.

Much of the cutting of aluminum is done with presses, circular and band saws, and heavy, mobile, rotary, chipper-type drills (routing machines) that cut through aluminum with the side of the drill in a manner reminiscent of a dental burr. The metal is smoothed with electric polishing wheels and buffers of various sorts. Danger to hands and fingers from such moving machinery is self-evident; the usual guards are placed on the machines wherever possible.

In these several operations particles are thrown in all directions and they offer definite threat to the eyes. Corneal foreign bodies are seen but with less frequency than among those working with iron. Because aluminum work is done indoors better cooperation is secured in the wearing of face shields and goggles. The metal itself is relatively light, does not impinge with much force and, consequently, does not so often penetrate the corneal surface. Corneal foreign body injury is almost entirely preventable, and we recognize that its continuing occurrence represents a failure to inculcate safe practices among our workers. Educational efforts are continuing to reduce this source of injury to a minimum.

Because of the metal's light color small corneal foreign bodies are even harder to visualize than iron particles. Fluorescein proves useful to demonstrate their location. Their removal and the subsequent treatment of the injured cornea are the same as that with other metallic foreign bodies.

WELDING OF ALUMINUM: Electric arc welding is a most effective method of fabrication of iron and steel, but basic differences in the metal make it almost valueless in joining aluminum materials. Unless aluminum welding is done by skilled workmen there is high spoilage of work. For this and other reasons riveting is the method of choice in uniting aluminum. A small amount of oxyacetylene torch welding is done, however, and special features thereof merit brief discussion.

In so-called fusion welding of aluminum a flux must be used which will remove oxide coating present on the surface of all aluminum and aluminum alloys.[12] In the absence of a suitable flux, this oxide coating does not melt at the welding temperatures, so will prevent smooth coalescence of the weld metal. The flux may be applied as a paste or used as a rod coating. Experimentation has shown that a satisfactory flux for aluminum welding must contain from 15 to 30% of fluoride. This usual aluminum flux also contains a variable amount of silicon, present as mineral silicate. The rod closely approximates the metal to be welded. Temperatures are relatively low in aluminum welding, but fume is produced and it contains oxidation products of the rod, rod coating and metal welded.

At fusion temperatures silicon and fluorine may unite and appear in the fume as silicon tetra fluoride (SiF_4). There may be a hydrolysis to hydrofluorosilicic acid and in some instances hydrogen fluoride may be present.[13,14] Both these substances are strong respiratory irritants and can be dangerous if allowed to accumulate in a confined work space.

In our ponton work two or three men are engaged in oxyacetylene welding at any one time. They work in a huge shop where general ventilation is excellent. Their work is done at a single large bench, and flexible, freely-movable, local exhaust ventilating ducts are at hand in profusion. The welders are experienced, they have been instructed regarding the noxious character of their welding fume, and they are using the exhaust ventilation effectively.

CLEANING, ETCHING, PAINTING: Because any expected health difficulties were known to center around these processes, plant engineers devoted extra care to design of ventilation equipment for the area in which they are employed. Overhead conveyors and mechanical hangers were provided to minimize human contact with substances involved. Special precautions for those employed at these processes were instituted. The workers received physical check-up where indicated, protective clothing was provided and special efforts were made to teach these workers the benefits deriving from cleanliness and avoidance of harmful materials. The hazards attaching to this work and the protective measures employed are described in the following paragraphs:

ALUMINUM CLEANER—OAKITE NO. 61: Physicians know that "soap" dermatitis occurs not infrequently as an occupational disorder. Some uncertainty is, therefore, bound to arise about the pathogenicity of a so-called alkaline detergent such as that under consideration. In evaluating its potential hazard brief reference must be made to the chemistry and toxicology of soaps and detergents. The subject is complex and our problem is made more difficult by the manufacturer who does not choose to supply detailed information concerning contents of his product.

It is unfortunately true that many producers supply very limited information to their sales representatives and they are often consequently led into misrepresentation about health aspects of their merchandise. When questions are directed to the home office, at least by this writer, answers received are usually evasive and incomplete. This particular type of military secrecy has nothing to do with the progress of World War II but is directed at trade competitors; obviously reticence of this sort seriously impedes the work of industrial safety and medical departments. The temptation is great to document the above assertion by including full correspondence with this particular company. Space does not permit that luxury but extracts from their letters are instructive when one realizes that the following is all that they are willing to release about their product:

". . . . In your case, however, you have established the need for more specific data and we are, therefore, making a fuller statement to you which we know you will treat with confidence. Oakite Composition No. 61 consists solely of silicates, phosphates, carbonates and surface active agents. This product does not contain free caustic, phenolic material, chlorinated hydrocarbons, chromium or heavy or toxic metals or amines. . . . We sincerely trust that the *more complete* information herein contained meets with your approval."

Adding further to my peace of mind is their written assurance that:

". . . . the materials in this product are not toxic or harmful in any way to the personnel, nor are there any objectionable fumes given off by it at its operating concentration and temperature."

One wonders what has been revealed that is worthy of a breach of confidence.

This and similar experiences in pursuit of facts from manufacturers lead me to urge immediate extension of "pure food and drug" type of legislation to industrial chemicals and products to which workers are daily exposed. It appears certain that many producers will not trouble to be certain of the safety of their products nor will they properly label and advertise the dangers in toxic materials until it is required of all by law.

Information from other sources leads me to believe that Oakite No. 61 is as safe as the producer claims. It seems to resemble many other aluminum cleaners which contain trisodium phosphate, sodium carbonate and sodium silicate,[15] and surface active agents which may be one of several neutral soaps or one of the newer wetting agents such as the fatty acid sulfates.[16] Because aluminum is readily attacked by alkalis and acids the detergent is kept very mildly alkaline. The silicate present acts to inhibit attack on the aluminum while permitting cleansing to go forward.

It seems evident, however, that an alkaline soap solution heated to 190° F will cause at least a temporary conjunctivitis if splashed into the eye. And even a pH of 10.5 is alkaline enough so that this substance must be listed as a primary skin irritant if repeatedly applied.

Schwartz and Tulipan[17] divide chemical agents causing industrial dermatitis into:

1. Primary irritants, or substances that will cause burns or dermatitis on normal skin, and

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2. Specific irritants, or substances that will provoke dermatitis only in hypersensitive persons.

Alkaline soaps are primary skin irritants that attack by dissolving protecting skin oils and epidermis. The skin is left thin and dry and has reduced resistance to pathogenic invaders. The soaps rarely act as allergens. Ability of the soaps to cause skin difficulty is proportionate to the amount of free alkali in the soap, the time of exposure to the irritant, and the native resistance of the individual's skin. Oakite No. 61 has little or no free alkali so its irritant qualities are probably very limited.

Although the castigation of this particular producer has more bearing on a generic problem than on this specific instance, it, nonetheless, belongs in this discussion. I am not able to report on the true pathogenicity of Oakite No. 61, for machine operation and protective clothing have completely prevented contact with the material. No skin or eye injury has arisen from this source.

Following immersion of aluminum parts in the cleansing solution they are thoroughly washed by a hot water spray and are then placed in a tank of 5% chromic acid for "etching."

For completeness sake it can be noted that ponton work does not require use of trichlorethylene and carbon tetrachloride, volatile and toxic "degreasers" much used for cleansing purposes in aircraft work.

CHROMIC ACID AND RELATED COMPOUNDS: Various acid solutions can be used to roughen or etch the surface of aluminum to afford a better surface to which protective paints will adhere. Commonly used acids are chromic, sulfuric or phosphoric, but use of chromic acid far exceeds the others[18] and it proved best for our ponton work. As stated, aluminum articles are immersed for two and a half minutes in a 5% chromic acid solution maintained at about 140° F. Our attention is drawn to the question of possible injury of those working with and near chromic acid from contact with the skin, the eyes and the respiratory passages, and to the question of internal intoxication.

Discussion on the toxicology of chromium-containing chemicals reveals a family similarity between the commonly used forms as chromium trioxide (CrO_3), its hydrated form, chromic acid (H_2CrO_4), and the sodium, potassium and ammonium bichromates ($Na_2Cr_2O_7$, $K_2Cr_2O_7$, $(NH_4)_2Cr_2O_7$). All of these chemicals have enjoyed wide industrial use and their clinical propensities are well defined.[17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29]

Chromic acid is caustic and will burn the conjunctiva or skin. Chromic acid, and its cousins, when present to excess, and even in small amounts as dust, fume, mist or spray act on the skin and the nasal mucosa to produce relatively painless, punched-out ulcers or "chrome holes." These ulcers arise at sites of minor abrasions around the nails, knuckles, backs of hands and forearms and the nasal septum. They usually develop slowly but sometimes perforate the cartilaginous septum in a few weeks. The ulcers have an indurated, undermined border, a gray, necrotic base and they vary in size from a millimeter to a centimeter in diameter. Major danger from these indolent ulcers is that they may serve as entrance for secondary invaders. Healing is slow and a permanent scar results. Septal perforations do not close spontaneously but the perforation causes little residual inconvenience when its edges heal.

Some persons seem able to contact chrome substances with impunity while others experience allergic phenomena such as papular eczema, urticaria, etc. Most writers state that chrome compounds are not systemic poisons unless absorbed in amounts of several grams. Reports of damage to the nasal septum through inhalation are legion but reports of pulmonary injury are not readily discovered. Johnstone[30] points out that British observers failed to note carcinomatous lesions resulting from chrome ulcers. He states that permanent disability from chrome injury is not even to be considered.

Because of the caustic and allergenic qualities of chrome substances in the working environment every effort is made to keep them out of the air, off the clothing and away from the skin. Preventive measures consist of exhaust ventila-

tion at the edge of the vat, face shields, impervious gloves, aprons and boots, protective skin creams, frequent washing of work clothing, and thorough bathing and change from work clothing to street clothes at shift's end. White petrolatum should be applied to the nasal septum before work and several times during each day. Medical examination of workers must be done monthly with temporary or permanent transfer of those found to have chrome ulcers or allergic manifestations.

Treatment of ailments due to chrome compounds consists of removal from the "chrome" environment, debridement of dead tissue in established ulcers and the usual protection of the wound while healing.

Our experience with the chromic acid bath was illuminating. The ponton contract was a rush job. As is usual with such hurry-up orders, the first few pontons were built largely by hand, before such conveniences as automatic, over-head, material-conveyor systems could be erected. Some aluminum parts were dipped by hand and in spite of instruction and protective equipment several of the less careful workmen exposed the hands and forearms to enough chromic acid solution to arouse an acute dermatitis. Removal from dipping operations worked a quick cure and the experience chastened both workers and supervision and produced a salutary effect. The position of medical and safety divisions was strengthened, warnings received credence and management and workers enthusiastically rushed installation of ventilation equipment and automatic material conveyors. Cooperation in rules for personal protection and hygiene was immediately improved. Since that first episode no further manifestations of chrome irritation have been observed.

After being "etched" for two and a half minutes the aluminum is washed very thoroughly in a hot spray, dried with a hot air blast, and immediately dipped into a large vat of primer coat, zinc chromate paint. This primer coat is immediately dried by hot air blast and the aluminum parts are then ready for assembly.

To paraphrase Dr. Hall, quoted previously and below[1]: "Zinc chromate primer is probably the most ubiquitous substance in an (aircraft) aluminum ponton plant." We are concerned with any toxic materials which may be liberated from the paint while fluid or drying and with any troublesome ingredients in the dried paint film.

ZINC CHROMATE YELLOW PRIMER: Primer coat paint as purchased from a number of large manufacturers must meet so-called Army-Navy Aeronautical Specification AN-TT-P-656b, in which the contents are more or less definitely outlined. It is as much a part of your education as it was mine to face the dilemma presented the ordinary physician by one of these specifications. Here, then, is the starting point in an evaluation of this particular paint.

Specification: AN-TT-P-656b.

"E. DETAIL REQUIREMENTS. 20 March 1944

"E-1. General.—The primer shall be equal or superior in all requirements to a control product manufactured in accordance with the control formula specified in section F.

"E-2. Composition.—The composition of the primer shall be as specified in Tables Ia and Ib.

TABLE Ia.
PRIMER COMPOSITION

Ingredient	Percent by Weight
Zinc Yellow	27.7 minimum
Extender	5.0 maximum
Modified alkyd-resin solids	21.0 minimum
Modfied phenol-aldehyde resin solids (1)	4.5 to 5.0 (2)
Stabilizers and suspending agents	1.0 maximum
Liquid drier (calculated to metal content)	0.1 maximum
Total Volatile	41.0 maximum
Total Non-Volatile	65.0 maximum

"(1) A highly heat-polymerized, oil-modified, phenol-aldehyde resin (dispersed in an essentially hydrocarbon thinner) having the following characteristics:
(a) Plasticizer content: 7% maximum on solids basis
(b) Acetone-extractible content: 37% maximum on solids basis
(c) Essentially non-oxidizing
(d) Drying effected by evaporation of solvent

"(2) The 5% maximum figure applies only to those phenol-aldehyde resins which contain tung oil or paraphenyl phenol.

TABLE Ib.
VEHICLE SOLIDS COMPOSITION

Ingredient	Percent by weight
Drying Oil Fatty Acids	38 minimum
Phthalic Anhydride (1)	30 minimum
Polyhydric Alcohols, Phenolic, or Other Modifying Agents, including Stabilizers and Suspending Agents.	Remainder

"(1) If phenol-aldehyde resins, alone or in combination with other resinous materials, are used in excess of 15% of the vehicle solids composition, the specified phthalic anhydride content may be reduced on a direct weight ratio. However, the phthalic anhydride content shall not be reduced below 20%."

A further descriptive statement throws illumination on the so-called "Volatile" fraction:

"E-46. Drying Time.—The primer shall air dry to handle in not more than five minutes and dry hard and tough in not more than six hours."

The specification lists a "control formula" which gives some further hint as to the type of materials found in this kind of paint:

TABLE II.
AN-TT-P-656b
CONTROL FORMULA

Ingredient	Percent by Weight
Zinc Yellow AN-TT-Z-416	28.0
Magnesium Silicate AN-TT-M-91	5.0
Beckosol P-372 (60% solids)	36.0
Bakelite No. 3962X (50% solids)	10.0
Xylene AN-R-X-876	20.0
Aluminum Stearate	0.4
Malic Acid	0.1
Lead Naphthenate Drier (24% Metal)	0.3
Cobalt Naphenate Drier (6% Metal)	0.2

The issue is clouded considerably by this instruction:

"I-2. Thinners.—Thinners other than that specified herein and which are recommended by the primer manufacturer for use with his product may be used to obtain improved results."

Further check permitted a tentative listing of ingredients as these:

Pigment.....Zinc chromate yellow
Extender.....Magnesium Silicate
Driers..... Metallic (lead, cobalt) / Linoleates / Naphthenates (Metallic salts or soaps of naphthenic acids.)
These include: modified phenol-aldehyde resin solids / modified alkyd resin solids
Lacquer.....Cellulose Nitrate
Volatile
Solvent.....Xylene
Thinner.....Toluene Substitute (for Xylene)

XYLENE, TOLUENE SUBSTITUTE: During and immediately following application of the primer coat the largest proportion of volatile material escapes. This is assumed to be xylene (xylole, $CH_3C_6H_4CH_3$) and so-called toluene substitute. Toluene substitute contains about 30% xylene, 10% butyl alcohol and 60% aromatic petroleum naphtha. Aromatic naphthas of high solvency are found to resemble or be homologues of benzene, xylene and toluene.[35] Both xylene and toluene substitute are closely related to benzene (benzol, C_6H_6) and share some of its well known toxic qualities. They are less volatile than benzene and it is presumed that this explains their seeming lesser toxicity.[3,21,31] Some writers[31,32] consider benzene less apt to cause chronic poisoning than the xylene and toluene. There is reason to believe that marked variation exists in individual susceptibility to these several toxic chemicals.

Acute and chronic poisoning with these substances may occur when they are used in poorly ventilated areas. Major symptoms relate to the nervous and vascular systems with dizziness, flushing, cyanosis, then pallor, muscular tremors, convulsions, delirium and narcosis. Chronic injury more frequently involves the blood-forming system with production of anemia and leukopenia, hemorrhage and lowered resistance to infection.

Except in the infrequent case of aplastic anemia or leukopenia temporary removal from exposure to these volatile solvents is treatment enough. Because there may

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be an element of individual sensitivity to the benzene ring among those with severe disturbance of hematopoiesis, such cases must not be allowed to return to work which exposes them to the original or similar toxic materials.

Workers in the immediate area of the primer tank and drier are protected through the use of powerful ventilation equipment. They are also receiving spaced check-ups with physical examination and hematological analysis. It has not been deemed necessary to supply respirators to those individuals working nearby.

NON-VOLATILE INGREDIENTS OF THE PRIMER: Other ingredients of the primer are not of moment during the application of the paint but are of interest in association with the various processes of assembly of the ponton where the workers are exposed to the dust of the dried paint film. It infiltrates their clothing and is breathed and ingested.

ZINC CHROMATE PIGMENT: The product is a complex salt, prepared by reacting zinc oxide with potassium dichromate.[33] Its approximate composition may be represented by $K_2O—4ZnO—4CrO_3—3H_2O$. Some recent types are essentially a basic zinc chromate, containing no potassium.

Search of toxicological literature reveals no evidence that this combination holds any serious threat to health or life in the small amounts inspired and ingested in ponton work. Tight binding of the pigment with a relatively insoluble resin film markedly decreases the chance of absorption of toxic amounts of chromium and zinc. Neither are particularly active as systemic poisons anyway. Thus far, Hall is the only writer to describe contact dermatitis due to zinc chromate pigment. In his experience with aircraft workers, mentioned earlier,[1] there were among the total exposed employees (approximately 65,000) 202 established cases of occupational contact dermatitis; 132 were shown to be sensitive to zinc chromate primer, and 90 of these reacted only to the pigment. The relative number of cases is not large but the sensitivity seems very active when established. He states: "After an employee has become sensitized, even the most indirect contacts may be sufficient to initiate a flare-up of the dermatitis; one patient was encountered whose dermatitis continued in severe form in spite of absence from work until his wife, who was a riveter, not sensitive to the primer, was transferred to a job where she no longer got any primer-coated drillings in her hair and on her clothing."

HALL points out that some workers are sensitive to the primer pigment, some to constituent resins in the primer and some to both pigment and resins. According to him, lesions due to the pigment appear only after long exposure, an average of seven months. They are nummular, eczematous plaques or groups of papules, starting as an ill-defined erythematous blotch, later becoming elevated, denuded and crusted. They localize on the dorsum of fingers and thumbs, volar forearms and occasionally at the V of the collar.

SCHWARTZ and TULIPAN[17] have this to say: "The chromate pigments are reported to have caused dermatitis among painters but the authors have not seen one case due to these pigments among many hundreds of painters examined."

Treatment is removal from exposure to the allergenic substance.

From Hall's report of the length of onset, we expected that ponton work might be completed before more than one or two such cases appeared. This was not the case. A few generalizations on this matter are to be found just after the next paragraph on primer coat resins.

RESINS IN THE PRIMER: DR. HALL determined that 17 of 132 workers (13%) found to be sensitive to zinc chromate primer were specifically sensitized to constituent resins and 19 of 132 (15%) to both resins and zinc chromate pigment. He found that average exposure was long in both groups before lesions developed, although three developed findings within a week. He reports that unlike the pigment, resins predispose to lesions on the eyelids, sides of the neck and cubital fossae. More swelling is noted and on the neck oval plaques appear parallel to the normal creases. Good pictures of the various lesions are found in his article.

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Resins are added to paints, enamels, lacquers and other coatings because they hasten "drying" and because they go through certain physico-chemical changes which yield a tough, long-lived gel that incarcerates the major pigment or may actually constitute much of the body of the protective film. Such resins are classed with the "drying oils." Closely associated with these "drying oils" are certain oil soluble metal salts, known as metallic driers, which participate in the drying process. In discussing driers, Mattiello[35] states:

"It should be recognized that the term 'drying' of a paint is a misnomer. The simple evaporation of the solvents and thinners in a paint or varnish will still leave, in a relatively liquid state, the remaining film of oil, or oil and resin, as the case may be. Therefore, it should be understood that by 'drying' we mean conversion of the non-volatile, liquid oil film to an apparently solid, non-tacky coating . . . ."

The metals in metallic driers, as they combine with other paint ingredients, apparently facilitate drying by conveying oxygen to the "drying oils." Commonly used metals are lead, cobalt, manganese and iron. As driers in the zinc chromate primer they are present in very small amounts, a fraction of one per cent, and are so tightly bound as to offer very little or no threat to health.

Resins used for drying purposes in our primer are listed as modified alkyd resin solids (21% by weight) and modified phenol-aldehyde resin solids (4.5 to 5.0% by weight). They are synthesized from tar acids (from coal tar and petroleum tar) and phenol by suitable substitution.

The modified alkyd resin is a naphthenate, most commonly compounded by a condensation of a naphthenic acid derivative called phthalic anhydride ($C_8H_4O_3$) and a polyhydric alcohol such as glycerin.

The modified phenol-aldehyde resin, similar to bakelite, is produced by condensation of phenol or phenol substitutes and various aldehydes such as formaldehyde.

SCHWARTZ and TULIPAN[17] report formaldehyde dermatitis among those producing formaldehyde-phenol resin but the product is so thoroughly washed and dried before use in paints that this cannot be considered a factor in resin sensitivity as described by HALL.

While "drying," resins may undergo oxidation, polymerization or chemical condensation so it is obvious that the final chemical form assumed by "dried" alkyd resin and phenol-aldehyde resin is anybody's guess. The finished film is highly resistant to heat, humidity and chemical attack so one is relatively safe in assuming it to be free of toxicity to man.

Patch-test Results for Primer Sensitivity

WE REGRET that lack of personnel familiar with patch-testing technique and interpretation prevented detailed study of all ponton workers who developed skin trouble while on this work. Following HALL'S[1] lead we suppiled a local dermatologist with dime-sized duraluminum plugs, some of which were unpainted, while others were coated with zinc chromate primer. His interest was such that our first aid department referred to his office most of the ponton workers who were considered suspect from the paint sensitivity standpoint. Using the sample plugs he tested 12 workers. Those who developed erythema or erythema and vesiculation under the test "plug" within 48 hours were considered positive. When itching developed, the test was discontinued. None was sensitive to duraluminum. Eight of 12, six women and two men, reacted to the painted plug. These had all worked at ponton work for a minimum of several weeks and were drillers or riveters. Four of the eight who were sensitive gave a history indicating multiple epidermal sensitivity to such materials as poison oak, or hair lacquer and nail polish. The dermatologist feels that sensitivity to zinc chromate primer has developed among some of those tested but has no definite conclusion concerning relationship of pre-existing sensitivity to similar allergens.

In general, a few persons have become sensitized to zinc chromate primer coat paint, but the number is very small in relation to the 2,500 exposed to the material.

Table Ib of specification AN-TT-P-656b gives the impression that a certain amount of fatty acid drying oil, usually linseed oil, may be included in zinc chromate primer. It is not under indictment by toxicologists and dermatologists and may be assumed to be more inocuous than the synthetic resin drying oils.

Assembly of Pontons

ASSEMBLY work involves twisting, climbing, standing and the many other physical chores inherent in drilling, reaming, bolting and riveting aluminum shell to rigid structurals. Although the finished ponton is relatively light at 1800 pounds, and sub-sections are proportionately less heavy, the component parts are of a size and weight to require handling by power-driven equipment. Muscular strains, sub-deltoid bursitis and painful backs arising from heavy lifting and the numerous fractures of toes and fingers so commonly occurring in iron fabrication are infrequent here.

In ship construction long falls produce many of the more serious accidental injuries. In ponton work scaffolding is two or three feet high and those working on the everted ponton are only six feet from the floor. It is still possible for an unselected workman to fall and be seriously hurt, but the possibility is much reduced.

As might be expected when hundreds of men and women switch to hand work with portable, electric drills and reamers and compressed air riveters, some develop tenosynovitis of hands and wrists, an occasional ganglion at the wrist, and a wide variety of strains and aches of the elbow, arm and shoulder girdle. With these disorders a few develop temporary areas of coldness or hypesthesia in the affected hand or arm. Treatment of such difficulties involves temporary shift to other work and rest of the affected part.

In the first few weeks of work while hundreds of new workers were becoming acquainted with use of electric drills it was all too common that a bit would eat rapidly through the thin aluminum shell and penetrate an inch or two into the anatomy of someone working on the opposite surface. In such injuries the usual precautionary treatment of a puncture wound was followed. Although soil contamination was usually absent due consideration was given to clothing, gloves or shoes as a possible source of anaerobic spores.

Oculists in this shipbuilding community have seen numerous instances of corneal burn or foreign body arising from work with iron or steel rivets and may logically wonder about similar injury from aluminum riveting. Much of the ocular hazard in iron riveting exists because the rivets must be incandescent when driven. The riveter and his associates often work in dark corners and may unthinkingly remove protective goggles to improve "seeability," thus becoming an easy mark for hot scale and sparks thrown off in the riveting.

Duraluminum, like the parent metal, is freely malleable and rivets are driven without preliminary heating. Because the metal is relatively soft and non-brittle, fragmentation is less common than with iron and hard-driven foreign bodies are of infrequent occurrence. I am told that aluminum rivets are often refrigerated and driven while cold in aircraft construction; thus far no pre-cooling of rivets has been done in ponton work.

The shops are very noisy but sound is not of such intensity as to produce auditory injury or aggravate pre-existing difficulties.

Neoprene Gaskets

WHEREVER aluminum surfaces overlap to form a seam a layer of neoprene (synthetic rubber) is inserted as filler or calking. This material arrives in sheets which are cut by hand into ribbons and various odd shapes to match the configurations of opposing aluminum surfaces.

Neoprene is prepared by polymerizing 2-chlorobutadiene—1,3, (CH_2=CCl—CH=CH_2) from acetylene and hydrogen chloride. Several writers report sensitivity dermatoses arising from natural rubber and from chemicals present in rubber as a result of faulty purification during processing,[26, 27, 28] and a number of articles describe the dangerous nature of the ingredients of neoprene, but no reference is found in recent medical literature to any ailment arising from the handling of the finished product.

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There is no reason to expect health difficulties from handling of this material.

Olive Drab Coat

FOLLOWING final assembly and testing the surface of the finished ponton is thoroughly cleaned with petroleum solvents preparatory to application of an olive drab coat of phenolic, lusterless enamel. The cleaning work is done outdoors where inhalation of solvent is not a threat. Skin of the workers is protected by a lipoid-resistant, water-soluble cream.

The phenolic enamel coating contains olive-colored pigment suspended in a varnish composed of linseed oil, phenol-formaldehyde resin, a "suitable" drier and a "suitable" hydro-carbon thinner (Army Engineer's Spec.) Its component parts resemble the zinc chromate primer in most respects. It is applied in the open, by spray method, and the workers wear protective garments and supplied-air masks which keep air-borne materials away from the breathing zone. No trouble is anticipated from this process or material unless workers completely disregard their instructions and protective measures. Safety inspectors check at frequent intervals to be sure that safe practices are followed.

Health and Safety Instruction

PROTECTIVE measures for each hazard encountered have been briefly mentioned in the preceding discussion. In entering upon this new job we have followed our established custom of securing health and safety facts, placing them before the plant supervision, and assisting in dissemination of information by letter and conference to leadermen and foremen. Safety officials have been at hand several times daily during the erection of the shops and initiation of fabrication work. Instruction of the workers has been done by their supervision, the safety staff and the doctors and nurses in the in-plant dispensary. Safe operation received impetus from the fact that supervisory personnel passed on lessons learned in building several pilot models of the assembly line product.

Description of protective equipment and safety features of the facilities would be redundant here. Such information will be supplied upon request.

Comment

CLOSE scrutiny of the several steps of aluminum ponton construction reveals that danger to life is not great; that machining and fabrication of this light metal presents hazard from foreign bodies, cutting machinery and riveting; and that the chief occupational threat is to the skin from sensitization by aluminum cleaners and paint coatings and to both the skin and nasal septum from attack by chromic acid. Systemic poisoning could conceivably arise from inhalation of paint solvents and thinners. Several types of injuries commonly seen in steel ship fabrication, among them those associated with high scaffolding, heavier loads and machinery, welding, and the working of a harder, higher melting-point, heavier metal, are much reduced or absent in aluminum work. Many potential hazards have been "built-out" by planning and those remaining are under control through preventive medical and safety work such as environmental ventilation, machine operation and elimination of human contact with noxious chemicals, preclusive placement and check-examinations of workers by doctors, use of protective equipment, safety instruction of workers and supervision, and repeated inspections by medical and safety departments.

We are fortunate that this particular project is relatively free of danger to workmen. Some not close to industry may wonder at a long health exposition where hazards are not severe. Please recall that rumored health hazards are just as destructive to morale and productive effort as real hazards and in our experience, ofttimes more so. Moreover, physicians must have facts and negative findings are of equal value with the positive. Long as this paper is, industrial physicians know that much more detail would be needed before it could be used as a guide in "selective placement" of handicapped workers, whether civilian or veteran. For such purpose a careful analysis of physical and mental requirements of each task would be necessary.

As one who came into industry at the start of the war with the usual physician's training and no experience in industrial medicine, I have felt keenly the extreme need for complete and detailed "medical-engineering" reports on the health aspects of industrial processes and entire industries. In lieu of such reports or other effective pedagogy every new industrial physician must spend years learning by experience and study what some other physician has long known. Such reports are of inestimable value to laymen in safety and health education efforts and they must be the guide to the busy practicing physician who will assist small plants falling within his immediate "sphere of influence."

Apropos of the general subject of private physicians and industrial health needs of small plants, I refer to an excellent statement in a recent issue of the New England Journal of Medicine[39] prepared by the Massachusetts Medical Society Committee on Industrial Health. It is pointed out that " . . . . three-quarters of the workers in Massachusetts are employed in the so-called 'small plants' of the Commonwealth, factories where there is still little or no medical supervision of industrial hygiene." This is even more true in our community. A further extract states: "A positive willingness on the part of management to employ a plant doctor must extend beyond the traditional readiness to consult the doctor after something has happened, which is mere medical care. Unless those concerned can look farther ahead and establish standards of prevention and health, they are going to let many things reach the stage of requiring medical care that might well have been stopped in advance."

If good industrial health work is to be done for the small plant, employing five to 500 men, it must be done by local practicing physicians or by some organism of their devising. To meet the needs of employer and employees the physician must have an understanding of industrial methods, of job requirements, and of industrial health techniques and industrial hygiene. The physician will need to establish such friendly liaison with management that his assistance will be called into play from the blueprint stage forward. I recognize that such "preventive" work may be many years away but it will come faster as private physicians learn about existing industrial preventive programs and as they become more vocal regarding their double obligation, to preserve health and to repair the ravages of disease and injury.

The tremendous impetus given to preventive medical work by wartime industrial experimentation makes inevitable an extension of large plant methods and benefits to small plants, presumably on a pooled resource, community or district-wide basis.[40]

Summary

HEALTH hazards encountered by 3,000 men and women in the building of aluminum pontons at Oregon Shipbuilding Corporation are reviewed in detail. The steps taken to build a safe and healthful work place are traced chronologically. Production methods are outlined step by step. Deleterious effects of the several job processes and toxic materials are described as: injury to hands and feet from machinery used in shaping and assembling aluminum; foreign body injury from cutting and riveting; eye and skin irritation from splashing of hot alkaline detergent and chromic acid; ulcer production on the skin and nasal septum by chromic acid; systemic toxic reactions from inhalation of benzene homologue solvents and thinners; and skin sensitivity to chromic acid, zinc chromate

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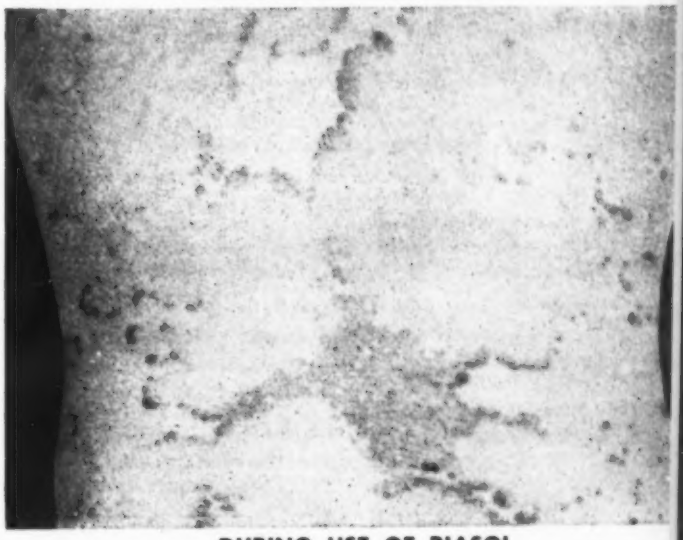

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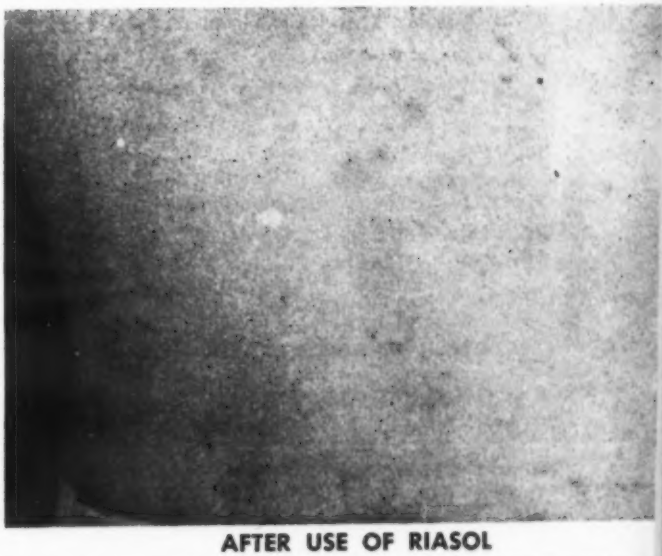

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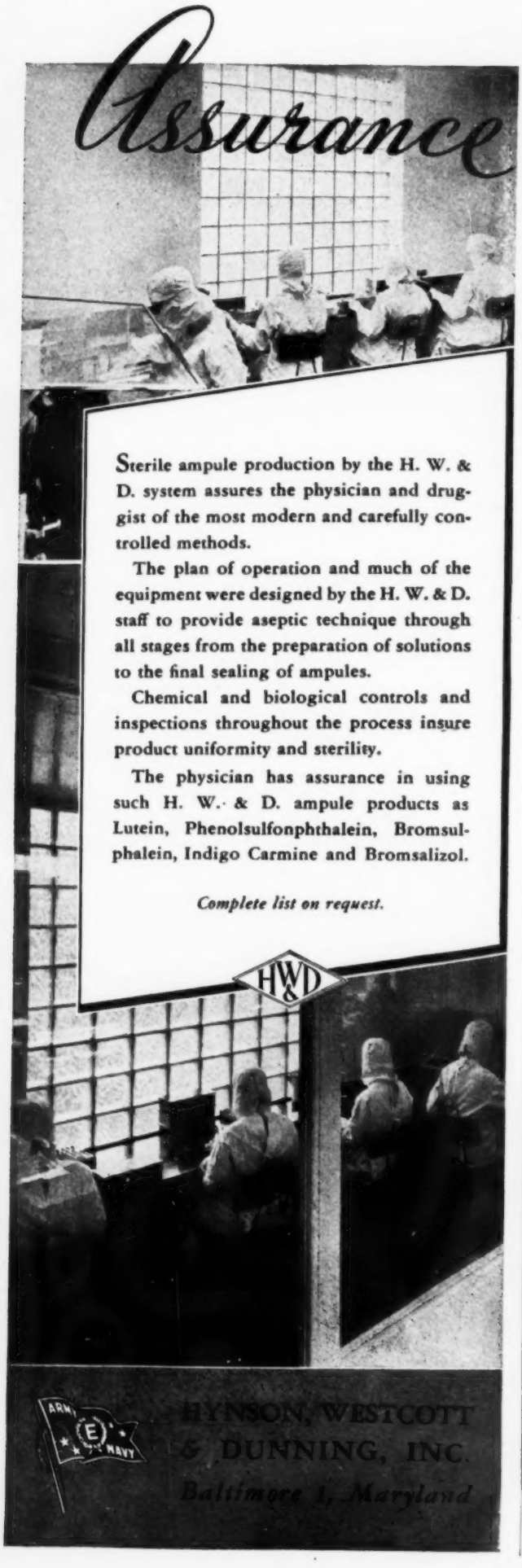
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General view of Assembly Building showing several steps in construction of so-called "half-pontons." Three thousand of these were construction in approximately 120 days

primer and lusterless enamel coating. Prevention and treatment of personal injury is given in each instance. Extension of "pure food and drug" type legislation is urged to compel producers to properly label and advertise the dangers inherent in products to which workers are daily exposed. Attention is directed to the need for research, study and leadership by private medicine in the industrial health field, especially in small plants.

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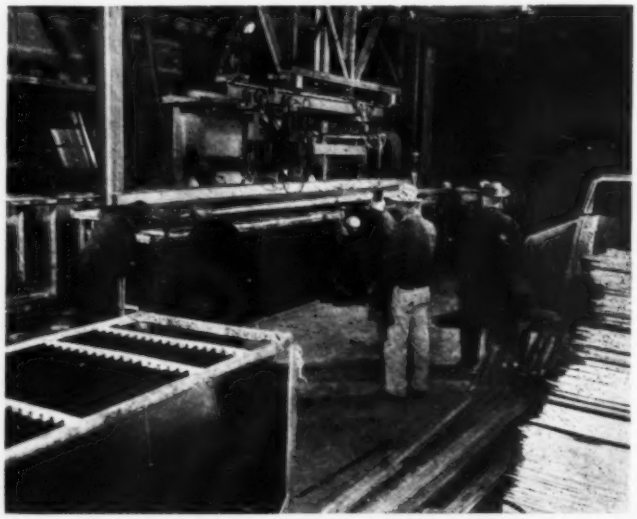

Loading the automatic, overhead, material conveyor that carries aluminum parts through cleansing, etching and paint vats without further human handling

Another view of the material conveyor system showing a water spray bath, left; the chromic acid bath with side-slot surface ventilation, right; and overhead ventilation in process of installation

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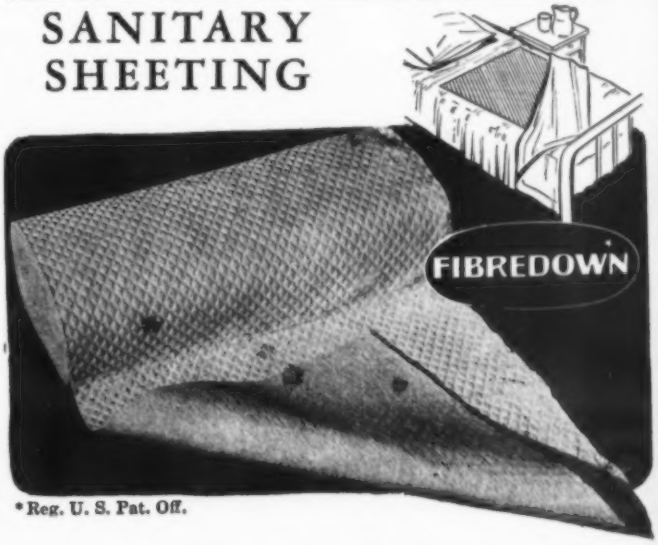

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INDUSTRIAL HEALTH and DISEASE

Establishing an Industrial Psychiatric Program

L. E. HIMLER, M.D.,
Assistant Professor of Mental Health,
School of Public Health,
University of Michigan

THE place of psychiatry in industry is difficult to define because the field is still new and progress has not extended beyond the exploratory stage. Besides its first responsibility of caring for those who are mentally and emotionally ill, psychiatry shares a common interest with industry in the application of sound mental health principles to that part of each individual's life which is spent in his vocation. But because psychiatry speaks a different language and uses techniques which seem foreign to the practical needs of industry, a satisfactory common ground for attacking industrial human relations problems remains to be found.

From *Personnel*, publication of The American Management Association, 22:1, 30-36, July, 1945.

From the outset it seems clear that any plan for the extension of psychiatric knowledge and methods to the industrial situation must be fitted into industry's existing organizational framework. It should be stressed that the conservation of mental and emotional health cannot be separated from provisions for the care of physical health, and plant physicians and medical departments have a recognized responsibility in both areas. Problems involving certain aspects of mental health also are shared by personnel departments. Where medical and personnel work is not smoothly integrated or where these two departments do not utilize to the fullest their opportunities for reciprocal service, the mental health of both individuals and groups of employees inevitably suffers from serious neglect. Both physicians and personnel workers vary considerably in training as well as in interest with respect to the many aspects of their work which require psychiatric understanding.

The psychiatrist who enters industry can best serve as a liaison executive between the medical and personnel departments, but without any formal administrative powers over either of them. The nature of psychiatric service is unique in that it functions more effectively in an advisory and consultative capacity which involves great responsibility but little if any outright authority. The acid test of a psychiatric program is how well it produces results as measured by improvement in human relations between departments and key individuals in an organization under precisely such conditions.

In setting up or in reviewing mental health programs for employees, the question frequently arises as to just what services the psychiatrist could provide which are not already being provided by other departments and individuals that have the additional advantage of long industrial experience. The answer is that he does not employ magical or revolutionary techniques to solve industry's mental health problems single-handed, but rather that his approach can exert a constructive and stimulating influence on the work of all the other individuals who share this responsibility with him. His efforts will of necessity have to be correlated and coordinated not only with those of medical and personnel workers but also with the activities of psychologists, counselors on all levels, and those in charge of training programs. The following is a partial list of some of the more specific functions in which the industrial psychiatrist would be expected to play an active part:

1. Correlation of techniques for improving the selection, placement and promotion of employees presenting some degree of mental, emotional or intellectual disorder.
2. Elucidation of techniques for uncovering actual as well as potential "problem employees" and for the handling of such individuals by supervisors, medical and personnel consultants, including the line of referral for those who require psychological or psychiatric consultations.
3. Participation in training programs for counselors and supervisors in respect to understanding and handling the psychological factors influencing the productivity of both normal and problem workers.
4. Checking the effectiveness of, and developing techniques for improving, all employment, medical and personnel functions involving interviewing and counseling.
5. Provision of a consulting service open to both management and labor union officials, as well as others who voluntarily request interviews.
6. Organization of research projects which throw light on causes and remedies of personality problems on both employee and supervisory levels.

Qualifications Needed

IT IS OBVIOUS that if industry is to utilize the services of psychiatrists to assume leadership in such functions, these men must be chosen with the same care employed in the selection of key members of the executive staff. Since at the present time only a few psychiatrists have proved their usefulness in the industrial field, there is limited precedent to guide management in this important step. But it can be said that selection of a psychiarist, as of other key men, should involve consideration not only of professional qualifications of training and experience but also of certain qualities of personality and interest. Possession of even the highest professional qualifications does not automatically equip a psychiatrist with all that is needed for successful work on the industrial level.

The training of a physician as a specialist in psychiatry ordinarily requires from three to six years of resident work in mental hospitals after graduation from an accredited medical school. Most states also require one year's rotating interneship in a general hospital before granting a license to practice medicine. In recent years specialty boards in the various branches of medicine have been set up, and thorough examinations are given before a candidate is certified as a specialist. Before he is eligible for the examination given by the American

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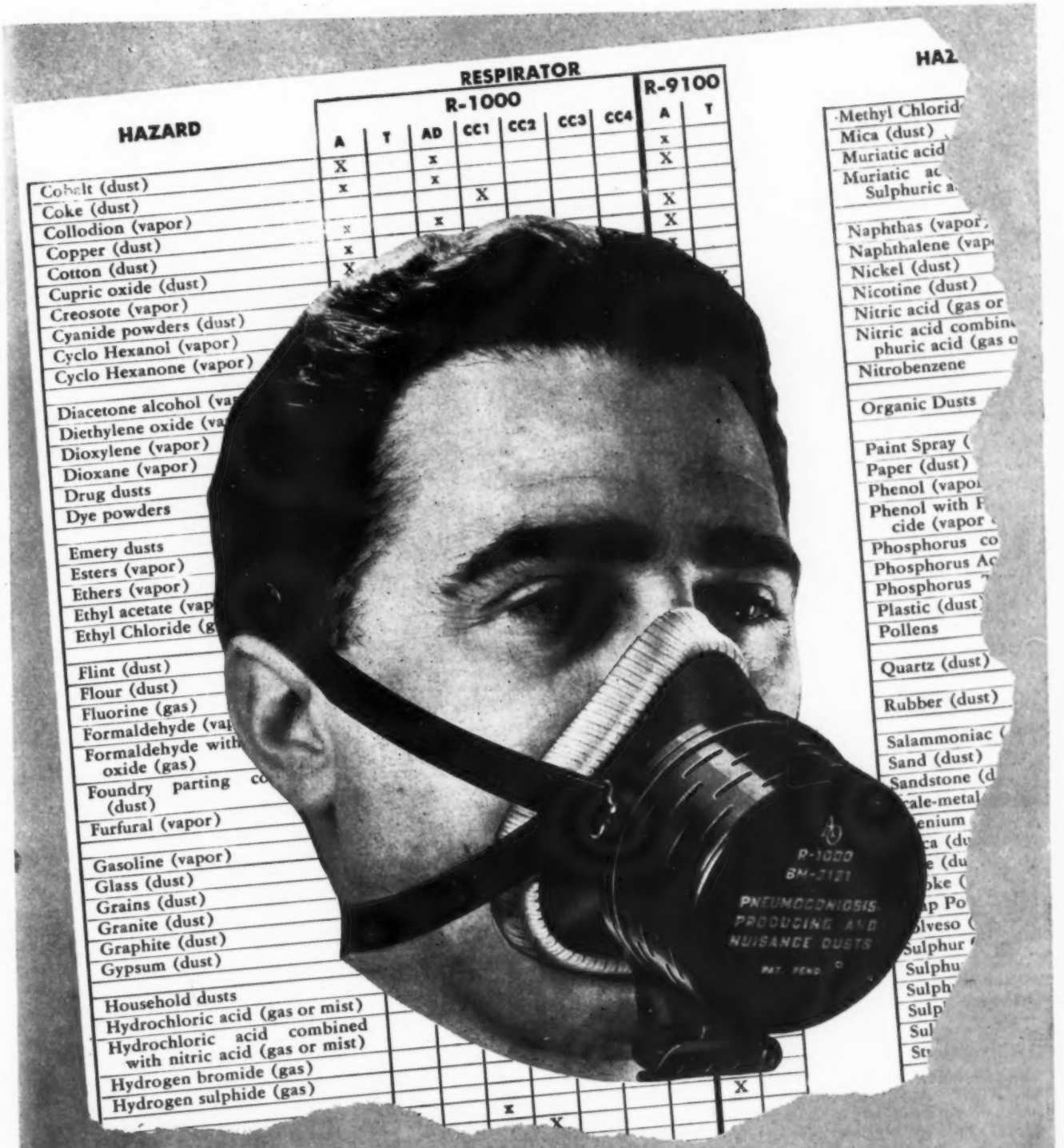

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"The therapy of a majority of the cases of contact dermatitis encountered in industry", according to the noted dermatologist, Dr. Frank C. Combes[1], "requires no further medication than the intelligent use of a *good buffer solution such as Liquor Aluminum Acetate (Burow's solution)* . . . and a *good crude coal-tar paste.*"

His preference for wet dressings solution is **Domeboro Tabs** ("widely used in industry", particularly by Parkes[2] at Curtiss Wright for cutting-oil dermatitis)—because it is "a convenient tablet which, when dissolved in water, releases a *lead-free aluminum acetate in appropriate dilution,*" with a substantial percentage of boric acid.

The *crude coal-tar paste* used at New York University, according to Combes, "is manufactured commercially under the name **Daxalan**"—which has been found *superior to distillates, filtrates and pastes containing liquor picis carbonis.*

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(1) Combes, F. C.: Indus. Med., July, 1944.
(2) Parkes, Morey: Indus. Med., January, 1944.

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Board of Neurology and Psychiatry, the candidate must have completed five to six years of training and experience in these two closely related fields. The scarcity of psychiatrists who have applied for recognition as specialists is revealed by the fact that up to March, 1945, only 1,809 certificates had been awarded for the entire country. However, the selection of psychiatrists for industry need not be restricted to those who have had extensive technical training. There are many eligible men who have not yet been certified but who have had adequate preparatory experience in established training centers and clinics for the treatment of psychiatric patients.

It is important to take into account the specific area in which the psychiatrist who plans to enter industry has had his previous experience. Psychiatry is a broad field with a number of sub-specialties, some of which have little in common with the types of problems that occur in industry. Different phases of the work are found in child guidance clinics, schools and colleges, state hospitals, and in private practice. A group of physicians have received special training in psychiatry while in military service, and it is quite possible that those who have had experience in military rehabilitation will become interested in the industrial field after they are released.

In this connection it should be recalled that the average physician, whether he subsequently specializes or not, receives very little direct training in industrial work. It would be helpful if fellowships or grants-in-aid were made available to young physicians who have completed their regular interneships and desire industrial experience. Those with a special interest in the field of psychosomatic medicine and psychiatry could assist in handling cases of this type coming to the attention of the medical and employment divisions. Of the physicians who have been given this opportunity, a certain number would be suitable for further training in psychiatry with a view toward remaining in industry.

Aside from his professional background and training, the industrial psychiatrist must have qualities of personality and interest which are adapted to the industrial scene. There is no place in this field for a man who merely wishes to escape an arduous practice, or who expects a lucrative return because of his professional title. Opportunists of this type should be recognized for what they are. The man best suited for this position is a mature, well-balanced, humanly understanding individual who is at ease among members of top management as well as among the rank-and-file workers, willing to take a direct interest in the everyday problems of men and women on the job, and able to speak their language. He must combine the functions of counselor, teacher and friend, and he must be both professionally and socially acceptable to the people he serves.

Psychology and Psychoanalysis

IT SHOULD be obvious that the interest of psychiatry in industrial human relations closely parallels that of its sister science, psychology, and particularly that branch known as clinical or applied psychology. The work of the clinical psychologist is concerned mainly with tests and measurements of intelligence, aptitude and special abilities, and this is as important in the industrial psychiatric program as it is in psychiatric hospitals and children's clinics. Applied psychologists who enter industrial personnel work can qualify after training equivalent to a master's degree, plus a year or two of supervised clinical experience under some psychiatric supervision. If the testing knowledge of the clinical psychologist is thus combined with adequate case history training and counseling skills, he is well equipped to take over a large portion of the work previously outlined as falling within the scope of the industrial psychiatric program. It is to be noted that the personality qualifications of the industrial psychologist should closely approximate those required for the psychiatrist who enters this field.

An interesting question arises concerning the place of psychoanalysis in the industrial mental health program. Embracing both psychiatry and psychology in many aspects, psychoanalysis includes a number of highly controversial doctrines and techniques for exploring deeply seated, unconscious causes of disturbances in emotion and behavior. As a science by itself, it constitutes an invaluable source of information for understanding the basic motivation of individuals. A certain degree of familiarity

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with psychoanalytic teaching must of necessity be part of the education of every psychiatrist, and this is one of the requirements for certification by the American Board of Neurology and Psychiatry. Well-trained psychologists also get at least an elementary training in psychoanalytic theory.

While this matter is admittedly open to differences of opinion, it is the writer's belief that it is not necessary to have special training in psychoanalysis as such in order to qualify for work in the industrial mental health field. Freudian theories help to understand some of the personality reactions engendered by the industrial atmosphere of aggressive competitiveness, but the techniques of treatment by Freudian methods are far too complicated and time-consuming to have any place within the framework of industry. It is of some interest that at the present time attempts are being made to devise a technique for "brief psychoanalysis," but until the special value of such adaptations is demonstrated, industry must look for help from established methods which can meet its practical needs. These methods involve trained interviewing and counseling skills.

Full-Time vs. Part-Time Services

APART from the problem presented by the scarcity of qualified men, at the present time it is doubtful that industries with less than 5,000 employees could profitably consider adding a full-time psychiatrist. As a rough basis for setting up a psychiatric program, once the value of it to a particular organization has been agreed upon, I should suggest that industries might consider employing a psychiatrist one day a week for each 1,000 employees. Properly trained industrial psychologists could be employed on a much more liberal basis by the larger industries, and it is likely that these men could adequately meet the needs of smaller industries if some psychiatric consultation were available to them. Channels for the referral of specific problems should be kept open between smaller industries and a consulting psychiatrist who has gained experience through contacts with larger organizations.

It is important not to confine the potential contributions of psychiatrists and those trained in the psychiatric viewpoint within too narrow a range of service. The mere screening out of borderline personality deviates, for example, important as this might be, must not be considered the chief reason for adding a psychiatrist to the personnel-medical team. Nor is the psychiatrist's function encompassed by conducting therapeutic interviews with extreme problem cases which are referred to him, valuable and helpful though such a function may well be.

The more important and larger task of mental health specialists is to help in building and maintaining constructive human contacts between the great mass of normal individuals who may never require special services, to discover and make use of the hidden human resources within an organization, and to teach by example practical methods of influencing and motivating individual employees and supervisors.

The types of problems which the psychiatric approach is able to modify and benefit range on an ascending scale from minor adjustment problems to complex emotional disorders, some of which interfere with health and happiness to the point where they are classed under the term psychoneurosis. Only rarely do frank mental cases come up for attention on the job.

The great mass of problems involving human nature in the industrial environment are not severe and do not require a psychiatrist for their solution, but if they are not given proper care and understanding, they tend to accumulate in a repetitive and habitual pattern. This tendency is revealed by the fact that some 30% of workers have been found to use up 80% of the time and effort of the personnel and medical departments. This group also presents the greatest single challenge to the psychiatrist and to those who assist in applying his techniques.

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The Interviewing Approach

THE approach to industrial human relations problems which the psychiatrist uses himself and which he can to a considerable extent teach to others may for practical purposes be considered an adaptation of interviewing techniques. Seen in this perspective, industrial interviews are classified on an ascending scale of complexity, ranging from simple informational contacts through job adjustment interviews (involving wages, promotions, layoffs, etc.) and, on a more advanced level, counseling interviews. Here are to be considered a variety of adaptations of the well-known Hawthorne technique.* Counseling interviews are to be distinguished from informational interviews in that emotional rather than merely factual material is involved, as in the handling of problem employees with complaints, dissatisfactions, grievances, or repeated personality clashes. Interviews regarding absenteeism also frequently fall into this class. Highest on the scale are interviews regarding physical and emotional illness, which are the province of the physician and the psychiatrist. The value of psychiatric training for industrial physicians is obvious when we but consider the great number of employees with nervous and emotional problems who find their way to the medical department.

It is not unreasonable to expect distinct improvement in from 70 to 80% of the counseling problems which come under the influence of the industrial psychiatrist or aides trained and skilled in his methods. The psychiatrist himself might best spend as much as possible of his therapeutic efforts on the supervisory level, in order to spread his influence over a broad base. It should always be remembered that psychiatric consultations in industry must be of the short-term variety which may be termed "psychiatric first aid." It is not industry's responsibility to provide prolonged psychiatric contacts for any individual any more than to provide extensive medical treatment for physical disorders. The writer's experience indicates that one or two well-placed and well-conducted interviews are all that the majority of problems require, provided opportunities for following through are kept open.

Importance of Follow-Up

ONE of the most important functions of the industrial psychiatrist is to activate a vigilant follow-up program for the constructive handling of human relations problems. Human beings tend naturally to relapse into previous patterns of behavior unless provisions are made to renew and reinvigorate constantly the corrective influences surrounding them. It frequently happens that industrialists become enthusiastic at the beginning of some new program in the human relations field, only to slip back gradually into old grooves if they are not periodically reincentivated. Follow-up stimulants need to be applied every two or three months if solid progress in this field is to be achieved.

Unfortunately it is impossible to make an advance classification of the types of mental and emotional subhealth which would require treatment by a psychiatrist, because many factors other than formal diagnosis enter into the picture. The quality and quantity of interviewing and counseling carried on by supervisors, stewards, personnel and medical staffs bear a direct relation to the number of employees who will be referred for special help. In industry the question is less a matter of knowing what kinds of problems will occur as it is of knowing how to treat those which interfere with work. A psychoneurosis, for example, can be very distressing to the patient without in any significant way interfering with his job; while in other instances the job suffers as much as, or more than, the patient. It is impossible to separate the condition from its setting. Obviously, a minor personality problem in a member of top management can cause more trouble and be more difficult for the psychiatrist to bring under control than a more serious condition in an individual of lower rank.

Not only the general and specific setting, but the time that a problem has been allowed to continue, and the age of the person concerned, are both factors which may materially influence the final outcome of any therapeutic approach. As with physical disorders, emotional disturbances which are neglected or poorly treated tend

*See "The Counseling Interview," by L. E. HIMLER, in Bulletin No. 16 of the Bureau of Industrial Relations, University of Michigan, Ann Arbor, 1945.

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readily to accumulate secondary complications. The factor of age may be illustrated by the case of one older supervisor who flew into a rage when the subject of morale among his men was merely mentioned. He accused the psychiatrist of being a spy, and the next day turned in his resignation. As might be expected, his departure did more to develop morale in the department than if he had been won over and had given grudging consent to modify attitudes which at the age of 55 were too inflexible to accept all the changes needed. A younger man under similar circumstances is usually agreeable to a discussion of human relations problems, even if he believes he has little to learn from the psychiatrist.

Much research needs to be done into the causes, types, settings, modifiability and prevention of personality and emotional problems in industry. Controlled studies are required to determine the degree of adjustment of psychoneurotic employees, including especially returned veterans, as compared to workers with physical handicaps. Psychiatry's program for industry is too new for any final answers to these important problems at present, but there is no longer any doubt that the techniques which psychiatry can demonstrate and teach have a distinct place in industry.

Division of Industrial Hygiene (Indiana)

—Annual Report for the Fiscal Year Ended June 30, 1945—

LOUIS W. SPOLYAR, M.D., Director

DURING the fiscal year 1944-1945 the entire efforts of the Division were directed toward the accomplishment of the war program adopted in 1943 and discussed in previous annual reports. Accomplishments toward that end were below those of last year due to the consistent loss of personnel to private industry. Major industrial health problems during the year centered about the use of mercury, fungicides, synthetic rubber goods, plastics, cadmium, lead, selenium, and insulating varnishes in Indiana industries.

Field Visits

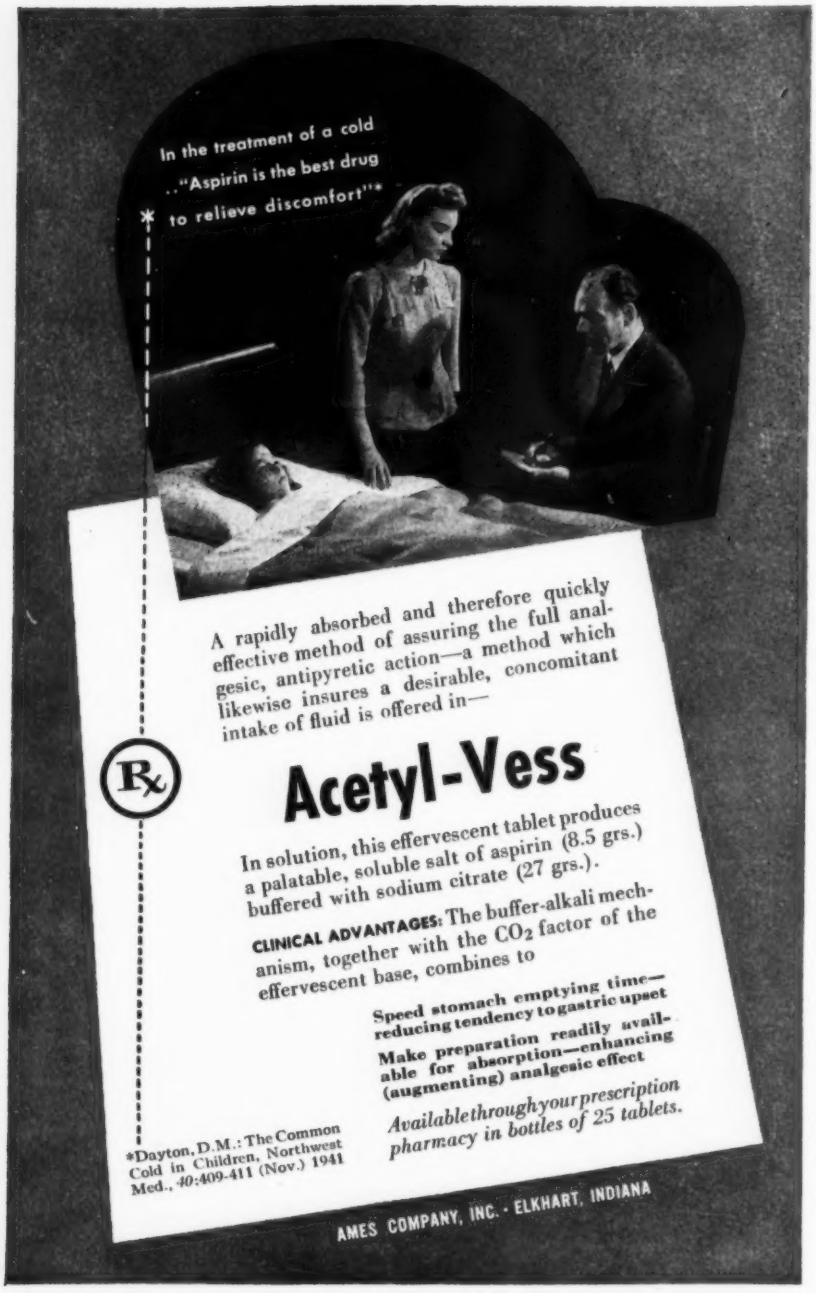
IN THE execution of the war program a total of 133 separate plant studies were made during the year. The 133 plants employed 47,440 workers, roughly 7.3% of our entire industrial population. A breakdown of the field studies showed that the field activity was initiated as a result of the following:

	Number
A. Requests for services by:	
1. Industry	
(a) Plant Managers	11
(b) Safety Directors	10
(c) Medical Directors	8
(d) Personnel Directors	4
2. War Manpower Commission	26
3. U. S. Government	24
4. U. S. Army	10
5. Complaints	7
6. Unions	6
7. State Labor Departments	5
8. Insurance Companies	3
B. Self initiated surveys	14
C. Follow-up studies	4
D. Morbidity reports	2

Statistically we find that 90% of all the field studies were begun for other reasons than just routine visits by this department. This again emphasizes the point that industrial hygiene services are actually sought for by all groups interested in the preservation of the health of the worker.

As a result of the 133 field studies 497 recommendations involving 12,774 workers, or 27% of all the workers covered during the year, were issued for the control of various occupational diseases. Of the 497 recommendations made 318, or 64% of those issued, involving 7,243 workers were satisfactorily complied with. On a population basis 56.7% of the workers covered by the original recommendations had better and safer working conditions due to industry's compliance with our recommendations. Owing to limited personnel follow-up studies, in order to secure greater compliance, were impossible. A detailed analysis of the recommendations is given in Table 1.

In the completion of these field studies it was necessary to perform 226 chemical analyses, make 404 air flow measurements, 20 medical examinations, and review 253 x-ray films, as well as perform some 150 patch tests in order to help determine the cause of some of the industrial epidemics of skin diseases. Table 2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*Dayton, D.M.: The Common Cold in Children, Northwest Med., 40:409-411 (Nov.) 1941
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comprises a summary of the chemical determinations.

Office Consultations

IN ADDITION to the field work, 222 specific requests for information, methods of control, treatment, methods of analysis, medical records, etc., were received in the central office by telephone, letter or visit. Table 3 shows the type of information requested during the year.

Industrial Nursing

TO DEVELOP a well rounded industrial nursing consultant service, 52 plants were visited by the industrial nursing consultant, MISS LUCILLE WALL.

In addition to the field visits, the consultant participated in the "Industrial Hygiene for Nurses" course developed by Indiana University and given in Evansville and in Terre Haute, Indiana.

Reporting Occupational Diseases

DURING the year 570 cases of occupational diseases were reported voluntarily to this division. All major outbreaks were studied and control procedures instituted. Industrial skin diseases again head the list of occupational diseases prevalent in Indiana, 497 such cases being reported. Of these 122 (24%) were due to cutting oils. Table 4 summarizes the occupational diseases reported during the year.

Educational Activities

ARTICLES for publication were prepared on the following subjects: Respirators, Cutting Oil Dermatitis, Reporting of Occupational Diseases, New Occupational Diseases, Heat Exhaustion, and Health Education in Industry. Thirty-six lectures were given by various members of the staff on practically all phases of industrial hygiene.

Summary

TO HELP reduce the incidence of occupational diseases in Indiana, numerous services were rendered by this Division. The cost of all this service was two cents per industrial worker in the state—a modest price for the prevention of occupational diseases. During the year there were four deaths due to occupational diseases.

Compensation costs on these deaths far exceed the present state budget allocated for the control of occupational diseases. With the exception of a death due to an accidental exposure to trichlorethylene, all other deaths were due to silicosis or silico-tuberculosis — diseases contracted some 10 or 15 years ago. Prevention pays huge dividends in decreasing compensation costs, increasing production, saving lives and reducing the incidence of illness.

TABLE 1.
RECOMMENDATIONS ISSUED FOR THE CONTROL OF VARIOUS EXPOSURES
TOTAL 497

	Number
Acetone	1
Acrolein	1
Aldehydes	2
Asbestos	7
Carbon monoxide	3
Carbon tetrachloride	5
Cyanides	13
Ethylene dichloride	4
Fluorides	1
Heat	2
Hydrogen sulfide	7
Industrial dermatoses (Total 93)	
Alkalies	3
Anti-rust compounds	1
Chromic acid	8
Cutting oils	30
Ditto inks	2
Fungicides (Tropicalization)	8
Rosin	1
Rubber and rubber compounds	12
Solvents	24
Synthetic resins	2
Zinc chromate	2
Lead	15
Mercury	8
Methyl ethyl ketone	5
Nuisance type dust	13
Paint solvents	7
Petroleum solvents	2
Plating fumes	9
Silicosis	254
Sulfur dioxide	6
Trichlorethylene	29
Welding fumes	8
Zinc fumes	3

TABLE 2.
LABORATORY DETERMINATIONS
TOTAL 226

	Number
Asbestos	6
Benzol	6
Carbon monoxide	7
Chlorine	2
Chromates	1
Cobalt	2
Dust counts	66
Formaldehyde	82
Graphite	2
Hexamethylene tetramine	4
Hydrogen sulfide	8
Iron	2
Lead	8
Manganese	2
Methyl ethyl ketone	6
Phenol	4
Silicon dioxide	6
Sugar	4
Sulfur dioxide	3
Toluol	8

TABLE 3.
OFFICE CONSULTATIONS
TOTAL 222

	Number
A. Inquiries relative to the control of exposure to:	
Acid fumes	1
Brucella suis	1
Cadmium fumes	3
Caron monoxide gas	2
Chloroform fumes	1
Dermatitis from:	
Carrots	1
Cement dust	4
Copper naphthenate	3
Cutting oils	5
Cyanides	3
Fiberglas	1
Leather	1
Synthetic resins	5
Synthetic rubber gloves	1
Tomatoes	1
Dusts	
Alfalfa	1
Cotton	1
Emery	1
Iron	3
Mercury	3
Rockwool	1
Rubber	1
Silica	7
Talc	2
Wood	1
Fluorides	1
Hydrogen cyanide	1
Lead	6
Radium	3
Rosin smokes	3
Selenium	1
Solvents (N.O.S.)	4
Sulfur dioxide	2
Trichlorethylene	5
B. Inquiries relative to the toxicity of:	
Acetone	2
Acetylene	1
Alkalies	1
Barium	1
Benzene	3
Cadmium	2
Carbon monoxide	2
Carbon tetrachloride	2
Chlorine gas	1
Chromic acid	1
Copper	2
Emery dust	1
Ethylene dichloride	1
Fluorides	2
Gasoline	1
Graphite	1
Indium	2
Lead compounds	12
Mercury	2
Methyl chloride	1
Methyl ethyl ketone	2
Oxygen	1
Pentachlorphenol	6
Phenyl mercuric salicylate	4
Pine oil extracts	1
Rubber dust	1
Selenium	2
Sodium nitrite	1
Sulfuric acid	2
Sulfur dioxide	2
Tin	1
T.N.T.	1
Trichlorethylene	6
Ultra-violet radiations	3
Zinc chromate	7
C. General inquiries:	
Brucellosis in industry	2
Carbon monoxide, analysis for	1
Compensation laws	4
Dermatitis	10
Fatigue	2
Fungus infections in industry	1
Health education	2
Lead poisoning, treatment and diagnosis	1
Literature in industrial hygiene	3
Medical and nursing service in industry	6
Organization of this Division	3
Respirators	2
Sanitation	2
Silicosis, treatment	2
Soaps in industry	3
Sterilization rubber gloves	2
Syphilis in industry	2
Tropicalization	9
Tuberculosis in industry	6
Women in industry	1

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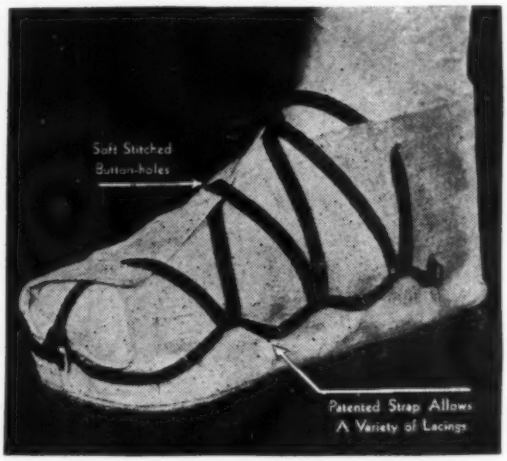

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TABLE 4.
OCCUPATIONAL DISEASES REPORTED TOTAL 570

	Number		Number
Benzol poisoning	1	Lead poisoning	9
Brucellosis (undulant fever)	5	Methyl chloride poisoning	1
Carbon monoxide poisoning	2	Silicosis (1 death)	5
Carbon tetrachloride poisoning	1	Silico-tuberculosis (2 deaths)	4
Chloroform intoxication	2	Silico-tuberculo-torulosis	1
Dermatitis	497	Trichlorethylene intoxication	2
Electric ophthalmia	4	Trichlorethylene poisoning (death)	1
Hydrogen sulfide poisoning	6	T.N.T. poisoning	1
Kerato-conjunctivitis	5	Typhus	3
Lead absorbtion	18		

Statement of the ownership, management, circulation, etc., required by the acts of Congress of August 24, 1912, and March 3, 1933, of Industrial Medicine, published monnnly at Chicago, Illinois for October 1, 1945. State of Illinois, County of Cook.—ss: Before me, a notary public in and for the state and county aforesaid, personally appeared A. D. Cloud, who, having been duly sworn accoruing to law, deposes and says that he is the Publisher of Industrial Medicine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit: (1) That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, A. D. Cloud, 533 Madison Street, Glencoe, Illinois; Editor, C. O. Sappington, M.D., 330 South Wells Street, Chicago, Illinois; Managing Editor, None; Business Manager, Stephen G. Halos, 605 North Michigan Avenue, Chicago, Illinois. (2) That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1% or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Industrial Medicine Publishing Company, 605 North Michigan Avenue, Chicago, Illinois; Charles Drueck, Jr., 58 East Washington Street, Chicago, Illinois; Stephen G. Halos, 605 North Michigan Avenue, Chicago, Illinois; A. D. Cloud, 533 Madison Street, Glencoe, Illinois. (3) That the known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. (4) That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. (5) That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months precedin~ the date shown above . . . (This information is required from daily publications only.) A. D. Cloud, Publisher. Sworn to and subscribed before me this 17th day of September, 1945. (Seal.) Leonora E. Fladung. (My commission expires August 24, 1948.) (Note—This statement must be made in duplicate and both copies delivered by the publisher to the postmaster, who shall send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the post office. The publisher must publish a copy of this statement in the second issue printed next after its filing.)

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Certification of Physicians and Surgeons in Industry

EDWARD C. HOLMBLAD, M.D.,
Managing Director,
American Association of Industrial Physicians and Surgeons
Chicago

IN 1933, the House of Delegates of the American Medical Association established the approval of American Boards in the various specialties. Requirements for such boards to obtain approval were defined in June, 1934, and the Advisory Board of Medical Specialties was set up, consisting of representatives from:

Association of American Medical Colleges.
American Hospital Association.
Federation of State Medical Boards of the United States.
National Board of Medical Examiners.
American Board of Ophthalmology.
American Board of Otolaryngology.
American Board of Obstetrics and Gynecology.
American Board of Dermatology and Syphilology.
American Board of Pediatrics.
American Board of Psychiatry and Neurology.
American Board of Radiology.
American Board of Orthopedic Surgery.
American Board of Urology.
American Board of Internal Medicine.
American Board of Pathology.
American Board of Surgery.
American Board of Anesthesiology.
American Board of Plastic Surgery.
American Board of Neurological Surgery.

Fifteen American Boards have been approved and are functioning as follows: Ophthalmology, 1933 (1917); Otolaryngology, 1933 (1924); Obstetrics and Gynecology, 1933 (1930); Dermatology and Syphilology, 1933 (1932); Radiology, 1933 (1932); Pediatrics, 1933; Psychiatry and Neurology, 1934; Orthopedics, 1934; Urology, 1934; Internal Medicine, 1936; Pathology, 1936; Surgery, 1937; Anesthesiology, 1937; Plastic Surgery, 1937; and Neurological Surgery, 1940. Several of these boards were set up by the re-naming and continuation of certification of specialists' examinations as conducted by the specialty societies, as indicated by the dates in parentheses. Thus, the American Board of Ophthalmic Examinations had certified physicians by special examinations in that specialty since 1917.

The certification of physicians who have met required qualifications in the specialty of surgery was pioneered most excellently by the American College of Surgeons, since 1913, and undoubtedly was the stimulating example that promoted similar certification in the other specialties.

The history of the development of the specialty of Industrial Medicine and Surgery is quite similar to the development of other specialties. Physicians became interested in this particular field, Bernardino Ramazzini (1700) usually being recognized as the father of Industrial Medicine. Although some very excellent work was done in the 1890's by such pioneers as Dr. Andrew M. Harvey, retired medical director of the Crane Company, and others, most of the development started between 1910 and 1920. Such men as Drs. A. M. Harvey, Harry E. Mock, Charles G. Farnum, J. C. Stubbs, W. E. Post, Thomas R. Crowder of Chicago, and S. M. McCurdy of Cleveland saw the valuable opportunity of the exchange of ideas, discussions, and conferences about their special problems, and organized the American Association of Industrial Physicians and Surgeons in 1915. This organization has had special committees to consider the certification of physicians and surgeons in industry since 1937. In 1941, two committees were appointed to act jointly in studying this problem. The committee from the American Medical Association consisted of Drs. Robert T. Legge, William A. Sawyer, Leverett D. Bristol, and Carl M. Peterson, and the committee from the American Association of Industrial Physicians and Surgeons were Drs. Frederick W. Slobe, Volney S. Cheney, Edward C. Holmblad, and C. O. Sappington.

The first meeting with the Committee on Standards and Examination of the Advisory Board for Medical Specialties was held in February, 1943. The carefully-worked-out organization plan for a Board of Physicians and Surgeons in Industry was presented and subsequently rejected on the following grounds:

1. The standards of the proposed Founders' Group were not clearly defined in proportion to qualifications established by other boards.

From the Industrial Health Number of *The Journal of the Indiana State Medical Association*, 38:10, 428-429, October, 1945.

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- to clear up congested conditions

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2. Adequate facilities for graduate training were lacking.

3. There was a question as to the existence of industrial medicine as a specialty.

The first objection has been easily met by restriction of the Founders' Group to less than 100 men in this specialty with national reputations and authoritative standing. This could even be reduced to 50 should the Advisory Board for the Medical Specialties so desire.

The second objection appears to be the most valid, and efforts to set up adequate undergraduate and postgraduate training in the specialty are making excellent progress. Several university medical schools are pioneering or have already established departments, institutes, and even professorships of Industrial Medicine. The graduate training program will establish, most probably, a three-year training, including: first year, basic science; second year, hospital residency in traumatic and orthopedic surgery, and special training in such divisions as x-ray study of chest conditions, industrial dermatology and allergy, and occupational diseases and medico-legal studies. The third year will consist of some practical experience in an industrial hygiene laboratory, and mostly active, practical industrial medicine and surgery practice in an approved medical department in an industry of adequate size and scope to give a competent training for this fellowship. It is planned that these fellowships be set up on sustaining honorariums of $1,800 to $2,400 per year.

The third objection seems to be the least valid for the following reasons:

1. There is a regular section of the A.M.A. devoted to Industrial Medicine.

2. There is a listing of the literature of this specialty in the *Quarterly Cumulative Index.*

3. The *American Medical Directory* for many years has listed physicians specializing in Industrial Medicine by the abbreviation "Ind." after their names.

4. *Journal of Industrial Hygiene and Toxicology,* INDUSTRIAL MEDICINE and other publications cover this specialty field.

5. The contemplated publication of a new periodical, under A.M.A. sponsorship, lends recognition to this field as a specialty.

6. For many years, there have been societies and organizations of industrial physicians and surgeons too numerous to mention here.

7. Questionnaires to physicians in military service list Industrial Medicine as one of the specialties for postgraduate study.

8. The greatest argument that Industrial Medicine is a specialty is the fact that the American Medical Association has deemed it so important that it appointed a Council on Industrial Health, whose work in the development of this specialty has been outstanding in its scope and merit. Continuation of this very fine work can only serve to develop the specialty to the magnitude and recognition it has long deserved.

9. The work of the American College of Surgeons, through its Committee on Traumatic Surgery and Industrial Medicine, as well as its recognition and approval of Industrial Medical Departments meeting certain standards, has aided the recognition of this specialty.

10. Such organizations as the American Public Health Association, National Safety Council, Health League of Canada, and others have sections on Industrial Medicine.

11. World War II has recognized the importance of Industrial Medicine and Surgery as a specialty in many ways in war plants.

One of the primary objectives of obtaining certification of Physicians and Surgeons in Industry on an American-Board level is to interest the best medical talent from our medical schools to take up this specialty as a life career. It is a fascinating specialty full of adequate challenge for the development of the best that medicine has to offer. Who would deny that the workers in industry deserve the best-trained, best-qualified, and most competent physicians and surgeons that can be had?

PEDICULOSIS

must be relieved *Quickly* among

WAR WORKERS

Early discovery, and immediate and effective control, are important in the treatment of Pediculosis among war production workers. Unless proper steps are taken, a single case of Pediculosis may lead to infestation of other employees.

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Thus, progress is being made towards certification of Physicians and Surgeons in Industry, even though at times it may appear somewhat slow. May we feel that this slow progress proves the development of strength, refinement of quality, value, educational opportunities, self-realization, and better service to the workers in industry by the eventual approval of the "American Board of Physicians and Surgeons in Industry."

The War's Impact and Influence on Industrial Medicine

C. D. SELBY, M.D.,
Medical Consultant, General Motors Corporation,
EARL F. LUTZ, M.D.,
Associate Medical Consultant, General Motors Corporation,
Detroit, Michigan

WORLD WAR II found industrial medicine ready. Its job, as in peacetime, was the maintenance of health, and for that no conversion was necessary. Of course, there was a shortage of experienced industrial physicians, but this was offset somewhat by the employment of a few additional practitioners, many nurses, and some lay technical aides. The Council on Industrial Health was instrumental in preparing the general practitioners for many of the problems which occurred in the smaller factories, and was responsible for promoting a bond of mutual understanding between the practitioners and the industrial physicians, which was helpful.

After December 7, 1941, the expansion of industry was beyond all comprehension, and in order to obtain the required number of workers practically every available citizen between the ages of 18 and 65, who was not in uniform, was hired. To the industrial physician such expansion meant the examination of hundreds of new employees. Handicapped, and otherwise, they had to be appraised as to their mental and temperamental capacities as well as to their physical capabilities and their experience.

In its infancy industrial medicine was most directly concerned with the repair of occupational injuries; during the war this function was relatively subordinate to the duties of health maintenance.

Besides taking care of the direct treatment of injuries, industrial physicians have given pre-placement examinations to new employees and recommended placement according to the physical, mental, and temperamental capacities; have made periodic re-examinations; initiated health education programs; diagnosed and treated occupational diseases; treated emergency non-industrial ailments with their subsequent referral to private physicians; inspected sanitary facilities; inspected cafeterias and advised on well-balanced diets; and have directed the training of emergency first aid workers among plant personnel.

On the whole, the wartime job was exceedingly well done, and certain important by-products have come out of it.

Administration

BECAUSE of the limited number of physicians available to industry and the consequent need of depending on assistants, industrial doctors have learned much about administration. They have learned to function on an "organize, deputize, and supervise" basis.

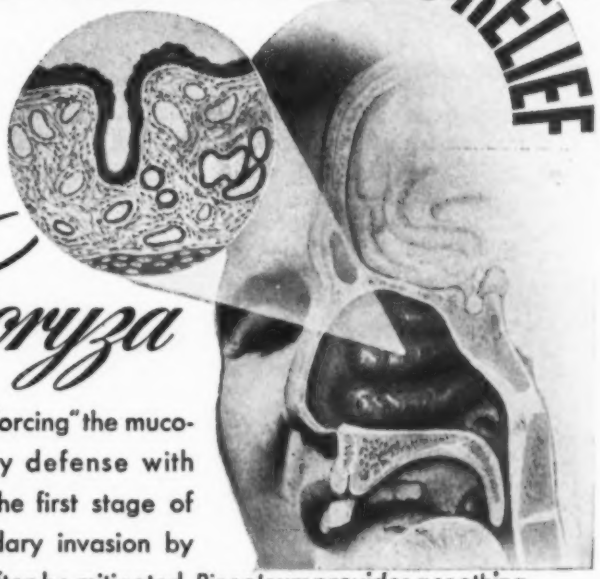
In some respects this proved to be advantageous, for it brought industrial medical service more nearly in line with other industrial practices and procedures. In one respect it may not prove to be so beneficial because too much delegation of medical functions to other than physicians may in the long run, if carried over into peacetime practice, result in a deterioration in the quality of the service. It will be the wise plant physician who will know where to draw the line after reconversion, when experienced doctors come back from the war and again become available.

Job Analyses

PRIOR to the war industrial physicians were supposed to know their plant processes so well that they could advise offhandedly on placement. The employment of handicapped and marginal people in large numbers required

From Industrial Health Number, *Journal of the Indiana State Medical Association*, 38:10, 378-381, October, 1945.

to provide REINFORCING RELIEF IN *Coryza*



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greater precision in determining placement, and that in turn resulted in a variety of selective placement procedures. Those were based on job analyses to determine physical requirements for efficient job performance, as well as examinations of the people to determine their physical, mental, and temperamental capacities, thus permitting the matching of employees and jobs. Such procedures have proved to be sufficiently effective, especially in the re-employment of veterans, to warrant the assumption that they will be continued and further developed after the war. If so, they will require increasingly more medical participation in employment routines and will necessitate also greater proficiency in methods of determining interests, aptitudes, and temperamental qualities of people seeking employment.

Tuberculosis and Syphilis Control

X-RAYS of the chest and serological tests became common in pre-placement examinations, and mass health surveys of industrial groups became more popular. These case-finding programs contributed importantly to the general control of tuberculosis and syphilis during the war, and, although not directly a responsibility of industry, their benefits to employee and community health have been of such value as to give them a permanent place in industrial medical practice.

Women in Industry

EMPLOYMENT of greatly increased numbers of women during the war brought additional health problems to plant physicians, largely in connection with sickness absenteeism. But the doctors were able to handle them more or less routinely, and the net result has been merely an increase in the volume of medical department service. Now that the war is over many women can be expected to return to their homes or their former employment.

Long Working Hours

THE custom of working long hours was followed only in the early months of the war. Industrial physicians were interested in the long work periods as a possible source of fatigue, and to some extent researches were undertaken. However, fatigue was and still is difficult to evaluate, and there was no outstanding progress toward a proved conclusion. The general feeling among industrial physicians was, nevertheless, that excessively long hours contributed to absenteeism and impairment of efficiency.

Later, when three shift operations became common, consideration of fatigue moved into the background and problems of fitness for second- and third-shift employment came to the front, largely because of the ease with which certificates of unsuitability could be obtained. As a means of correcting that situation and promoting better understanding between plant physicians and general practitioners, some meetings of medical societies were held in the plants. As these enabled the general profession to obtain first-hand views of working conditions and the extent of industrial medical supervision, they proved to be desirable, and the custom seems likely to continue under the auspices of the Council on Industrial Health of the American Medical Association and local industrial health committees.

Standing Orders for Nurses

INDUSTRIAL physicians, and more especially nurses, have long seen a need for standing orders, particularly for nurses employed in small plants having part-time or on-call medical service. Such orders were prepared by the Council on Industrial Health and published August 28, 1943. Since then they have been available in reprint form through the Council and have been widely distributed. Standing orders are important to proper medical service in small plants, particularly for the reason, among others, that they are a clear guide to judgment and assist nurses in deciding which cases may be treated by them, and how, and which should be referred to plant physicians or general practitioners.

Dermatitis

THERE is reason to believe that dermatitis was fairly well controlled by the doctors of the war industries although it did lead the occupational diseases in frequency of occurrence and time lost. Control measures throughout have been wholly conventional, continuing in the form of such expedients as protective clothing, gloves, creams, and facilities for cleansing, although perhaps a bit more sedulously applied. This is a field for fundamental researches: What gives skin its protective qualities? What

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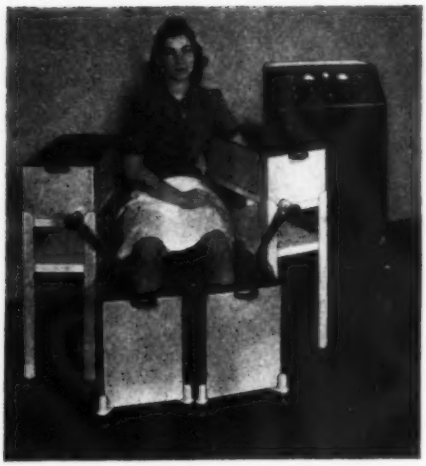

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changes take place in skin that fails to protect? And, what can be done to restore protective qualities?

Repetitive Ailments

RELATIVELY newcomers among the occupational diseases were the myosites, tenosynovites, and kindred conditions caused by a constant repetition of movements in certain hand operations. These ailments have been partially controlled by suitable engineering changes in tools and their handles, keen judgment in the "hardening" of new employees, and by transfers to other jobs in obstinate cases.

Treatment of Non-industrial Cases

THE shortage of private physicians made it necessary for industrial doctors to be doubly cautious against the indiscriminate care of non-industrial sicknesses and injuries. Frequently employees would claim it impossible to obtain the services of a physician, and, when true, it was exceedingly difficult for plant doctors to deny them attention. Furthermore, many physicians, extremely busy in their private practices, welcomed opportunities to delegate minor services to the plant doctors. It is hoped that the many well-intentioned efforts in this direction will not prove eventually to be a source of embarrassment when physicians become available in greater numbers for private practice. Generally speaking, they probably will not become so, for industrial physicians usually have handled such delicate matters with tact and skill; they have foreseen possible developments even more portentous—in the form of industrial clinics for the general care of employees, which possibility must be avoided.

A Code of Ethics

DR. E. S. JONES, chairman of the Committee on Industrial Health, of the Indiana State Medical Association, published a code of ethics entitled, "Industrial Medicine in Action," in the August 1944, issue of *The Journal* of the Indiana State Medical Association; an excellent contribution which should be read by all physicians, both in private and in industrial practice.

Dr. Jones covered the rights of industry to choose its own doctors for pre-placement and other examinations, and the diagnosis and treatment of occupational diseases and injuries; to develop its own health supervisory programs; and to choose consultants for the care of occupational diseases and injuries. He defined the ethical method of referring patients to private practitioners for the care of nonoccupational sickness, and in the event of differences of opinion suggests proper methods for consultation between private practitioners and industrial physicians. He also set up a procedure for reviewing expert medical testimony by county medical societies. The publication of this code of ethics has been a significant development in industrial medicine.

Periodic Examinations

UNDER the pressure of pre-placement examinations of large numbers of new employees, and other more urgent medical department services, periodic health examinations have admittedly been relegated to less crowded moments, which rarely have occurred. Now comes the changeover with its layoffs and an easing of the pressure on the plant physicians. It is expected that periodic examinations will be restored to full effect with the reconversion.

Inspection of Cafeterias

ALTHOUGH plant cafeterias have not been a development of the war, their use has been greatly extended in the war industries, and plant physicians have seen the importance of routinely inspecting them and examining the attendants. The doctors have known full well that improper food handling, dish washing, and refrigeration are always potential sources of veritable explosions of enteric disease. Such prevention has been the heavy responsibility of plant physicians. Although most doctors have readily admitted that they are not dietitians, their knowledge of nutrition and the deficiency diseases has been a definite spur to cafeteria management in planning balanced meals. Sanitary inspection of plant cafeterias will continue.

Health Education

METHODS of disseminating health information among industrial groups have varied greatly. Industrial physicians have realized its importance, but they have been too engrossed otherwise to give it very much attention, so health education has not progressed as an industrial medical activity during the war.

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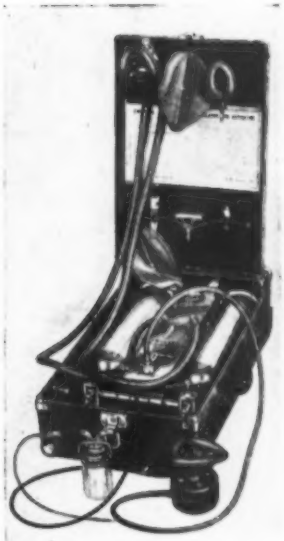

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In the meanwhile, the nation has become health conscious, and there is a general demand for information of that nature. The public is getting it through popular magazines, newspapers, over the radio, and from other not too authentic sources. Industrial physicians are not, unfortunately, publicists, and it is difficult for them to devise and promote good mass methods. On the other hand, they have been responding to individual requests for health information from thousands of perturbed war workers, and in doing so they have as a group accomplished much in health education. That counselor service, as it has been known, is greatly valued by industrial management, as well as by the workers, and it certainly will become increasingly important in its influence on industrial health.

Management Health

THE strain on industrial management was terrific during the war. The reasons were obvious to everybody, but more especially to industrial physicians, and they were concerned because they saw results which varied from minor breakdowns to total disabilities. Considerable attention was therefore given to management health, especially in the latter part of the war, and various plans were developed in its behalf. Generally speaking, they provided for rather complete diagnostic health examinations of the higher executives and key men, with explicit advice on how to prevent and overcome impairments of health without too much disturbance of normal life and industrial usefulness. That move has been extremely significant, for it has been, and no doubt will continue to be, of influence in creating proper attitude on health among industrial leaders and in fostering the conception of positive health and its maintenance, which has been so well expressed by Raymond Hussey, dean of the School of Occupational Health, Wayne University.

Industrial Hygiene

THE control of occupational diseases during the war was so outstanding that industrial hygiene engineering established its position for all time. Although industry itself, because of the shortage of trained personnel, was forced to depend largely upon the official agencies, ably promoted by the Division of Industrial Hygiene, of the United States Public Health Service, it is reasonable to assume that industry will proceed to install its own industrial hygiene laboratories as soon as reconversion and availability of trained personnel permit.

Return of Veterans

EXPERIENCES with the veterans who have returned to employment thus far are proving the value of selective methods of placement, and with the use of those methods industrial physicians are finding that the veterans' problems are not of the magnitude they were at first thought to be. As this is written, experiences with a considerable number indicate that the per cent of those who require special consideration is relatively low—less than 10%. On the whole, the veterans are now being recognized as normal people coming back from a tough job, and their return to civilian employment is becoming much smoother; nevertheless, it is fortunate that selective placement procedures are available and in use.

Mental Health

INDUSTRY has become interested in the methods of the Army Air Forces for selecting men who were capable of learning the techniques and withstanding the physical and emotional strains of combat flying. Although combat flying and civilian employment are not remotely comparable, the personnel procedures (for maintenance of morale as well as selection) are now recognized as the same in principle, differing only in the extent necessary to practical application in industry.

Insofar as the methods for determining mental and physical fitness are concerned, industry has made some very real progress during the war, but not so much in methods for determining temperamental fitness, and those are now beginning to loom large on the personnel horizon of industry. Industrial physicians have been more or less

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indifferent about the development, and in the absence of their leadership industrial psychologists have been taking over, with aptitude testing as their spearhead.

For the reason that the physical and temperamental qualities of people are closely related and interdependent, medical leadership would appear to be desirable if not essential.

However, we may find it is true that the sudden ending of the war may cool industry's interest in this only slightly-plowed area of personnel management, yet further studies of human relations in industry (humanics) may be expected. Physicians in industry, whether or not it is realized, are positively concerned with the mental health of the employees, and they should be influential in guiding any developments of that character that might come out of the experience of the war.

Training of Industrial Physicians

EXPERIENCES in the war industries have exploded the idea that any doctor can be an industrial physician without special preparation and training. Consequently, industrial management now wants doctors with the "know-how" to direct the health maintenuance programs of their reconverted industries. In the latter days of the war several schools and universities laid plans for graduate instruction in industrial health; and it appears now that substantial progress may be made in that direction. This, of course, is fundamental to good industrial health practices.

And Finally

THE war has produced opportunities for industrial physicians to improve their professional, industrial, and economic positions, and in doing so they have aided the entire medical profession to improve its public relations. Their ability to maintain the war gains during and after the reconversion will depend, of course, chiefly upon the industrial doctors themselves, but to no small degree will it also depend upon the intelligent and helpful interest of such organizations as the Indiana State Medical Association and its members.

Industrial Fluoride Exposures

HAZARDS from industrial fluoride exposures were discussed at a meeting of the Metropolitan New York Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION on September 6, 1945, by industrial hygienists who have had much experience in this field.

DR. CHARLES R. WILLIAMS, Liberty Mutual Insurance Company, Boston, reported fluoride exposures of workers engaged in several phases of magnesium founding operations and showed the levels of urinary fluoride excretion attained from these exposures. In addition he presented atmospheric data on other fluoride exposures.

DR. DUDLEY A. IRWIN, Medical Director, Aluminum Company of America, Pittsburgh, stated that industrial hygiene surveys conducted by the U.S.P.H.S., state departments of industrial hygiene, and his company, showed the fluoride exposures in the reduction plants operated by the Aluminum Company of America to be below the limits set up as being compatible with the health of employees. Medical surveys conducted on employees exposed to fluorides for periods up to 30 years, give evidence of some fluoride retention in the osseous system. This retention has not caused any disability. Gaseous and particulate fluorides produced in the reduction plants are so greatly diluted that they present no health hazard to individuals in the plant or those living in the vicinity. Methods have been developed to wash the fluoride from the air exhausted from reduction plants.

DR. GORDON C. HARROLD, Industrial Hygiene Consultant, St. Louis, reported that a review of the various sources of fluorine hazards points to the possibility that industry might be called upon to bear an unreasonable share of claims regarding injurious effects of fluorides which might not be entirely the responsibility of industry. The analysis of several thousand samples indicating that fluorides in light metal founding operations can lead to health defects, particularly when soluble inorganic fluorides are involved. This contention has received verification through studies of the atmosphere and individuals in welding operations where large amounts of fluorides are used. A large amount of analytical data is available to substantiate this contention. In the case of atmospheric contamination, the taking of numerous samples is facilitated by a fluoride test method developed to determine rapidly and accurately the amount of fluorides in the atmosphere.

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